LOV™ FRYER GENERATION II
TECHNICAL REFERENCE MANUAL

Frymaster

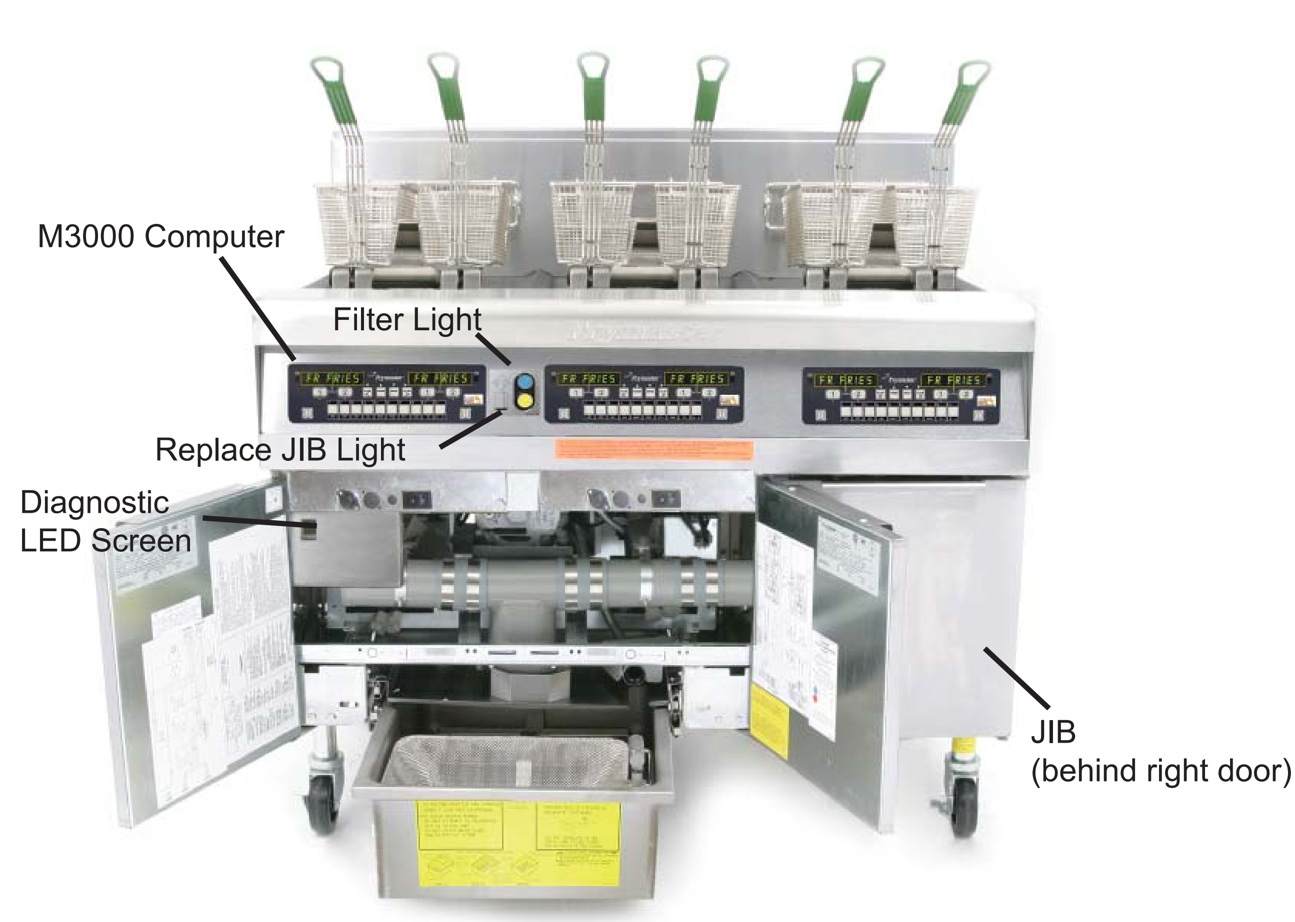




Frymaster and Dean Technical Service
8700 Line Ave, Shreveport, LA 71106
Service Hotline: 800-551-8633
Website: www.frymaster.com

8196506

FEB 2010 Edition

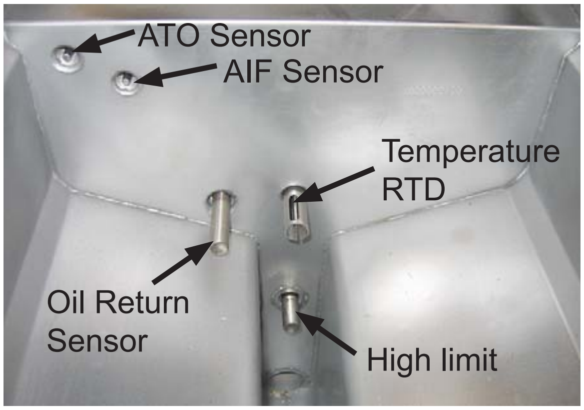


The LOV™ fryer.

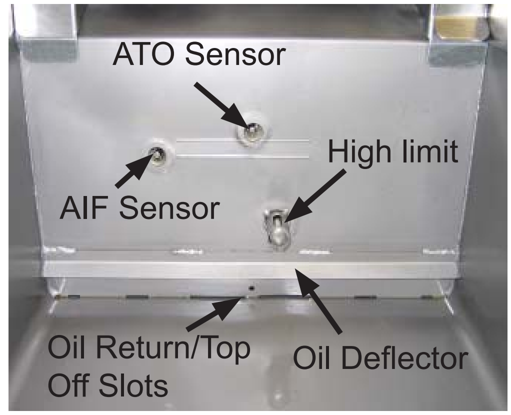
Introducing the Low Oil Volume Fryer

The Low Oil Volume (LOV™) fryer is a McDonald's-only, feature-laden version of the electric RE fryer or gas H55 fryer. The enhancements found on the LOV™ fryer include:

- **Low volume frypot** — 30 pounds (15 liters) rather than 50 pounds (25 liters) of oil.
- **Automatic top-off** — the fryer automatically maintains an optimal oil level with a reservoir in the cabinet.
- **M3000 computer** — a sophisticated controller with multiple levels of programming.
- **Automatic filtration** — the fryer performs hands-free filtering at prescribed cook cycle counts or at prescribed times.
- **Oil savings** — The combination of a low-volume fry vat and oil automatically kept at a optimal level, reducing oil usage.



Ports and sensors inside a gas frypot. Oil return/ top off is at bottom rear of cool zone.



Ports and sensors inside an electric frypot.

The LOV™ Systems

Auto Top Off

The core of the system is the automatic top-off board, which senses when the oil level is low and fills the pot to the top line.

The oil level is monitored by an RTD (**R**esistance **T**emperature **D**etector) sensor in the frypot at the upper oil level. The oil is moved to the pot from a reservoir, called a JIB (**J**ug **I**n **B**ox), to the frypot with a pump.

A circuit board, the ATO (**A**utomatic **T**op **O**ff), is located inside a box behind the JIB. It monitors the oil-level RTD and activates the pump when it senses an oil temperature drop of 60°F (33°C) below set-point, indicating the oil has moved away from the sensor. The ATO sends a signal to the MIB (**M**anual **I**nterface **B**oard), which then sends a signal to the AIF to open the actuator on the return valve of the frypot to be topped off.

Once the actuator has opened the return valve, oil is pumped into the vat for a specified amount of time (approximately 60 seconds). When the ATO RTD detects a temperature within 55°F (30°C) of set-point, it is satisfied and the actuator closes the valve.



The ATO board positioned underneath the LON gateway controls the top off of the fry pots.

Top off will continue on the next vat if needed. The system is not suited to filling the frypot when it is empty and there are safeguards to prevent it from activating when the fryer is cold and the oil is resting at the lower position.

The system is not active until the oil in the frypot reaches setpoint. That temperature is monitored by the temperature probe. The activation of the system is handled by the fryer's computer, the M3000. The automatic top off system is also inactive during filter dispose cycles.

The system works the same in McDonald's gas and electric LOV™ systems.

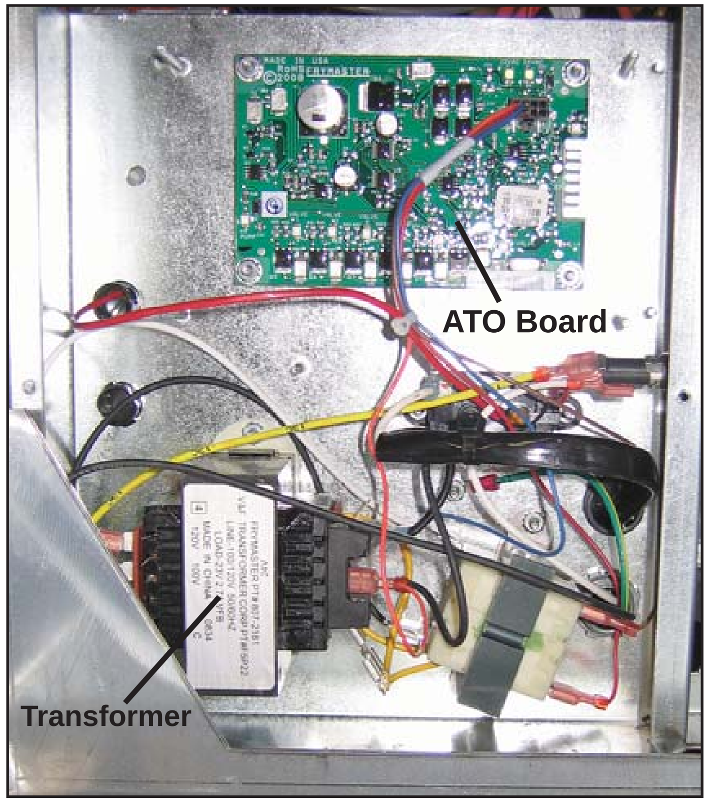
The level of the reservoir, or JIB, is monitored by the ATO and the M3000 computer. If a low oil condition is not rectified with two top off attempts or within 6 minutes, the low JIB light is illuminated on the front of the fryer. It will stay illuminated until the JIB is replaced and the orange button has been pressed and held to reset the light (see page 34).



The pump that moves oil from the reservoir to the frypots is visible above.



The reservoir, or JIB, rests behind the right door of the fryer. A light on the front of the fryer illuminates when the jug is empty.



The ATO board is positioned under the LON gateway in a box with a transformer that provides power to the board. The LON gateway must be removed to access the ATO board.

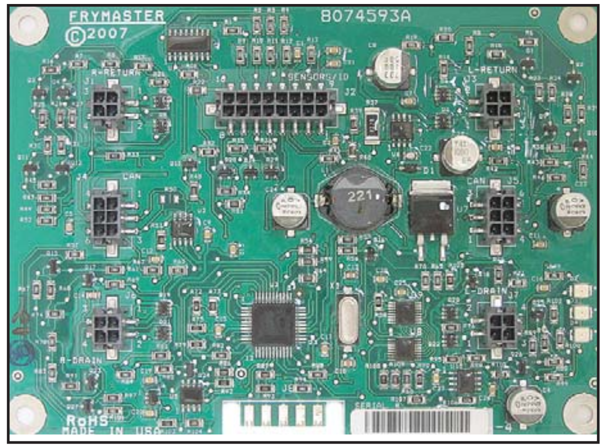
Troubleshooting the Top Off System

Problem	Probable Causes	Corrective Action
Frypot tops off cold.	Incorrect setpoint.	Ensure setpoint is correct.
No power to ATO board.	A. J5 connection unplugged. B. Fuse blown. C. Transformer malfunction.	A. Check to ensure J5 on front of ATO board is fully locked into connector. B. Ensure fuse below right control box is not blown. C. Check that proper voltage is present at transformer. See charts on pages 43-47.
The yellow JIB low light won't illuminate.	A. Loose wire connection. B. Power in the component box is not present. C. Failed transformer.	A. Ensure the yellow LED is securely attached to plug J6 on the ATO board. B. Ensure power is present in the component box. C. If power is present in component box, check the transformer for correct voltage.

Problem	Probable Causes	Corrective Action
Frypots won't top off.	A. Probe temperature lower than setpoint. B. Oil is too cold. C. Bad Connection. D. ATO board power loss. E. Failed transformer/harness. F. ATO pump failed. G. Failed ATO board.	A. Check to see that fryer is heating. Fryer temperature must be at setpoint. Check ATO probe resistance. If probe is bad, replace the probe. B. Ensure that the oil in the JIB is above 70°F (21°C). C. With the computer OFF, press TEMP button and ensure the ATO version appears. If not, the connection between the AIF and the ATO board may be bad. Ensure the 6-pin CAN connectors are tight between AIF (J4 and J5) and ATO (J10) boards. D. Power to the ATO board has been cut off. Restore power to the board and clear any service required errors. E. Ensure transformer in ATO box is functioning properly. Check power from transformer to ATO board. Ensure all harnesses are plugged securely into place. F. Ensure pump is operational. Check voltage to pump. Replace the pump if defective. G. Check for proper voltages using the pin position charts found on pages 43-47. If ATO found defective, replace ATO board and clear any errors.
One vat tops off but other vats fail to top off.	A. Loose wire connection. B. Actuator issue.	A. Ensure all wiring harnesses are securely connected to ATO board and solenoids. B. Check return actuator to ensure actuator is functional.
Incorrect vat tops off.	A. Wired incorrectly. B. Flexlines connected to wrong vat.	A. Check wiring. B. Switch flexlines to correct vat.
One vat doesn't top off.	A. Filter error exists. B. Actuator, pump, loose connection, RTD or ATO issue.	A. Clear filter error properly. When CHANGE FILTER PAD YES/NO is displayed, do NOT press any button until the pan has been removed for at least thirty seconds. After thirty seconds have elapsed, the computer returns to OFF or last display. B. Check actuator, ATO pump, wire connections, RTD and ATO board.

Auto Filtration (MIB and AIF)

The auto filtration system is controlled by the M3000 computer, the AIF (**A**utomatic **I**ntermittent **F**iltration) board and the MIB (**M**anual **I**nterface **B**oard). The filtration is made hands-off by actuators operating the drain and return valves.



An AIF board is mounted under each fry vat.

The computer is programmable, and it allows filter cycles to be launched after a set number of cook cycles and a prescribed elapsed time.

The system can be set to lock out automatic filtration during busy times, such as the lunch rush.

The fryer prompts for filtration by illuminating a blue LED on the front and a text prompt on the computer. The operator can say no; cooking can continue.

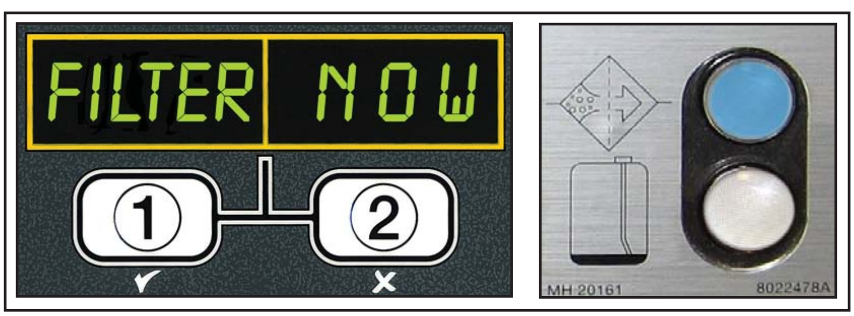
Responding "yes" leads to communication between the MIB and the AIF boards. The MIB controls and oversees the filtration; the AIF board operates the actuators, which open and close the valves.

The MIB is in the fryer cabinet. It is partially covered by a sheet metal cover and the LED display is visible. Buttons behind the cover allow limited manual operation of the system and its valves. The cover should be reinstalled after service.

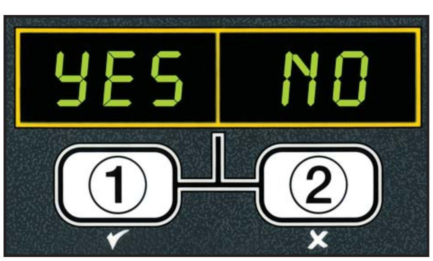
The LED displays codes that can be used to diagnose failures (see chart on page 45).

(1) Responding to the Blue LED filter prompt with "yes" starts a filter cycle that lasts about as long as a cook cycle (approx. 4 minutes). Communication between the M3000 computer, the manual interface (MIB board), and the automatic intermittent filtration (AIF board) handle the process.

(2) Actuators open and close the drain valve and return valve, (3) emptying and refilling the frypot.



1



2



3



Mode Display
Shows status (auto or manual) vat number (when operating valves manuals) and displays error codes.

Vat Selection
Selects vat for manual operation of valves.

Manual/Auto
Switches fryer from auto to manual operation.



The MIB board.

Reset
Resets system, ensures all valves are closed.

Drain
Opens and closes drain valves in manual mode.

Return
Opens and closes return valves and turns on filter pump in manual mode.

Manual — Used to toggle between automatic and manual filtration mode. **The unit must be in manual mode for the other MIB buttons to operate.**

Select — Used to scroll through the vats, which are shown numerically in the LED.

Drain — Used to open and close the drain valve of the vat indicated on the display. When pressed an LED on the button indicates activity: slow blink, awaiting response from AIF; LED illuminated constantly, drain open; no illumination, drain closed.


The MIB is mounted behind the left door. See arrow.

Return — Used to open and close the return valve on the vat indicated on the display. It also controls the pump. When pressed an LED on the button indicates activity:

- **blink:** awaiting response from AIF,
- **LED illuminated constantly:** drain open,
- **no illumination:** drain closed.

The pump operates with a momentary switch. Pressing and holding the return button after the valve is open activates the filter pump. Releasing the button deactivates the pump.

The mode display on the face of the MIB board displays a range of letters, which indicate activity or an error. **These codes are listed on the next page.**

Error Codes

1L, 1r - 5L, 5r — Numbers correspond to vats: “L” indicates the left side of a split vat. “r” indicates a full vat or the right side of a split vat.

A — Auto mode: auto filtration enabled.

E — Drain or return valve not in desired state: display alternates between **E** and vat number. (Ensure actuator is plugged in and in the home position.)

n — Network Error: An “n” displays for 10 seconds if no communication is received from the cooking computer within ten seconds after a power on.

P — Pan switch: filter pan is not in place or not sensed. Auto Filtration disabled.

r — Reset: r alternating with a vat number indicates that the MIB board is resetting. If **r** is displayed without alternating with a vat number, a problem may exist with the MIB board itself.

Three horizontal lines — temperature sensor: sensor did not detect that the vat was full during auto filtration.

Manual Draining, Filling, Filtering with MIB



1. Press the M button, which switches the board to manual. The display becomes the number of the vat to be controlled manually.
2. Press the vat selector button until the desired vat number is displayed.
3. Press the drain button to drain the oil or the press and hold the return button to return oil to the vat displayed. Opening the drain and pressing and holding the return button after valve is open allows filtration.
4. Pressing the M button again returns the board to automatic mode.

Troubleshooting the Manual Interface Board (MIB)

Problem	Probable Cause	Corrective Action
Auto filtration won't start.	1. Filter pan out of position. 2. Oil Level is too low. 3. Ensure MIB board is not in manual mode. 4. Ensure MIB cover is not damaged and pressing against buttons. 5. Filter relay has failed. 6. AIF disable is set to YES, blue light doesn't light. 7. Filter motor thermal switch is tripped. 8. AIF clock enabled.	1. Ensure filter pan is fully inserted into fryer. 2. Ensure oil level is above the oil level sensor. 3. Ensure MIB board is in "A" automatic mode. 4. Remove and replace cover and see if filtration will start. 5. Replace filter relay with part number 807-4482 24VDC relay. 6. Set AIF disable in Level 1 to NO. 7. Press filter motor thermal switch. 8. Ensure AIF clock is set to disabled.
MIB display shows something other than an "A" or vat number.	An error has occurred and displayed character indicates error.	See MIB display diagnostics on page 46 for explanation.
No power present at the MIB board	Transformer has failed in left component box.	Check output on the left transformer in left component box; should read 24VAC. If not replace transformer.
MIB will not clear error.	Error remains in non-volatile memory.	Press and hold reset button in top right corner for five seconds. The drain, return and manual/auto LEDS will illuminate and the MIB will reset and clear any remaining errors from memory. Allow 60 seconds to reset. If an error still exists, then another issue exists.
MIB indicates incorrect number of vats.		Ensure the CAN bus system is terminated at **BOTH ENDS** (on the M3000 connector J6 and on the ATO board connector J9) with a resistor equipped 6-pin connector. • Unplug and reseat all wiring harnesses in CAN system. Resistance between pins 2 and 3 on the CAN network connectors should be 120 ohms. • Check software version numbers on all M3000 computers and ensure all display an AIF version. If an AIF version is missing, the AIF board may be missing power. Check pins 5 and on J4 and J5 of the affected AIF board for proper voltage. • The locator pin in J2 of the AIF board is either loose or in the incorrect position. See the chart on pages 47 of this manual for proper pin position.

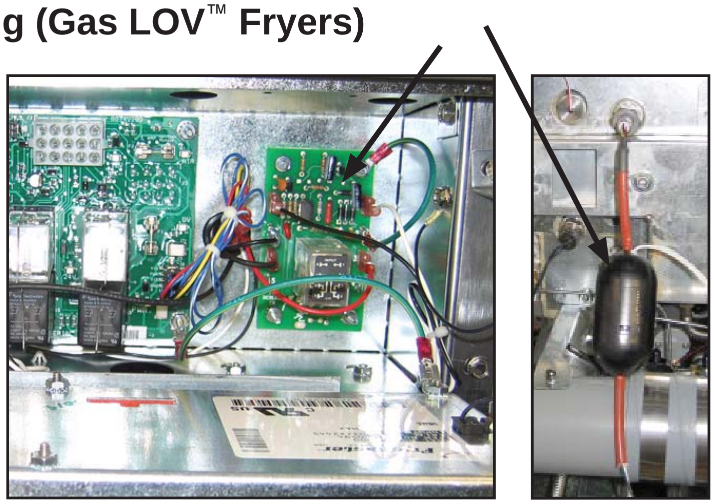
Problem	Probable Cause	Corrective Action
MIB board alternating "E" and "vat number and side."	Network error on the CAN bus communication.	A. Ensure the CAN bus system is terminated at BOTH ENDS (on the M3000 connector J6 and on the ATO board connector J10) with a resistor equipped 6-pin connector. B. With the computer OFF, press TEMP button and ensure the AIF version appears. If not, the 24V to the AIF boards may be missing. Ensure all 6-pin CAN connectors are tight between the M3000 (J6 and J7), MIB (J1 and J2), AIF (J4 and J5) and ATO (J10) boards. C. With the computer OFF, press TEMP button and ensure the ATO version appears. If not, check the CAN wire harness between the AIF board J4 or J5 and the ATO board J9 or J10. The ATO fuse on the right side of the ATO box may be loose or blown; the 110V to the ATO transformer may be missing or bad. The J4/J5 connector may be loose. D. Check to see if MIB has 24V on pins 5 and 6 of J2. Check to see if 24V is present on pins 5 and 6 of wire harness plugging into J4 or J5 of the first AIF board. If 24V missing, check the pins. Replace the harness if necessary. E. Check continuity between each color wire on the CAN connectors into J7 on the far right computer and J10 on back of the ATO board (black to black, white to white, and red to red) and ensure there is no continuity between different color wires (black to red, red to white, and white to black). F. Ensure black computer locator wires are connected from ground to correct pin position (see pages 43-47). G. Ensure all boards have the corner ground wire attached and tightened. H. Check for loose locator pin or incorrect positioning in J2 of the AIF board. See the charts on pages 43-47 of this manual for proper pin position. I. Bad MIB and/or AIF board. J. Broken resistor lead. Unwrap the resistor leads and check ends.

Troubleshooting the AIF System (AIF)

Problem	Probable Cause	Fix
Wrong vat opens.	1. Actuator is plugged into wrong connector. 2. Locator pin is in wrong position.	1. Ensure the actuator is plugged into the correct connection (J1 for FV return, J3 for DV return; J6 for FV drain, J7 for DV drain). 2. Ensure the locator pin is in the proper position in plug J2. (See charts on pages 43-47 of this manual for proper pin position.)
Actuator doesn't function.	1. No power to AIF board. 2. Actuator unplugged. 3. AIF board failure. 4. Actuator readings are out of tolerance. 5. Actuator is bad.	1. Check pins 5 and 6 of J2 at the MIB board. Should read 24VDC. Check voltage on pins 5 and 6 at the other end of the harness and ensure 24VDC is present. Check pins 5 and 6 for 24VDC on plugs J4 and J5 on AIF boards. 2. Ensure actuator leads are plugged into AIF board (J1 for FV return, J3 for DV return; J6 for FV drain, J7 for DV drain). 3. Check the power on the connector of the problem actuator while manually opening or closing the actuator. Pins 1 (black) and 4 (white) should produce +24VDC when the actuator is opening; -24VDC should be read from Pins 2 (red) and 4 (white) when the actuator is closing. If either voltage is missing, the AIF board is likely bad. Test the actuator by plugging into another connector to open or close. If the actuator operates, replace the board. 4. Check resistance of the potentiometer between pin 2 (purple wire) and pin 4 (gray/white wire). Closed should read 0-560Ω. Open should read 3.8KΩ - 6.6KΩ. 5. If proper voltages are seen at the connector and the actuator doesn't operate, replace the actuator.

Oil Return Sensor Troubleshooting (Gas LOV™ Fryers)

The oil return sensor is a device that is used to prevent dry firing of the burners. The sensor looks similar to a high limit. The sensors are energized when the computer is powered on with a soft on. The sensor heats up and detects the oil around it. During filtration when the oil is drained, it senses the difference between the oil and air. It is controlled with a board located next to the interface board (right) and a separate egg shaped plastic device (far right) that contains additional electronics. Use care when working with the sensor as temperatures may reach as high as 500°F (260°C).



The oil return sensor is controlled by a small green board and the electronics inside the plastic, egg-shaped device shown above to prevent dry firing.

If oil is surrounding the heater, the oil will prevent the heater from ever reaching its setpoint. Once oil is removed during filtration, the heater reaches setpoint and cycles a thermostat every four seconds. Since the cycle is only four seconds long, the seven second delay is not made and the gas valve won't open.

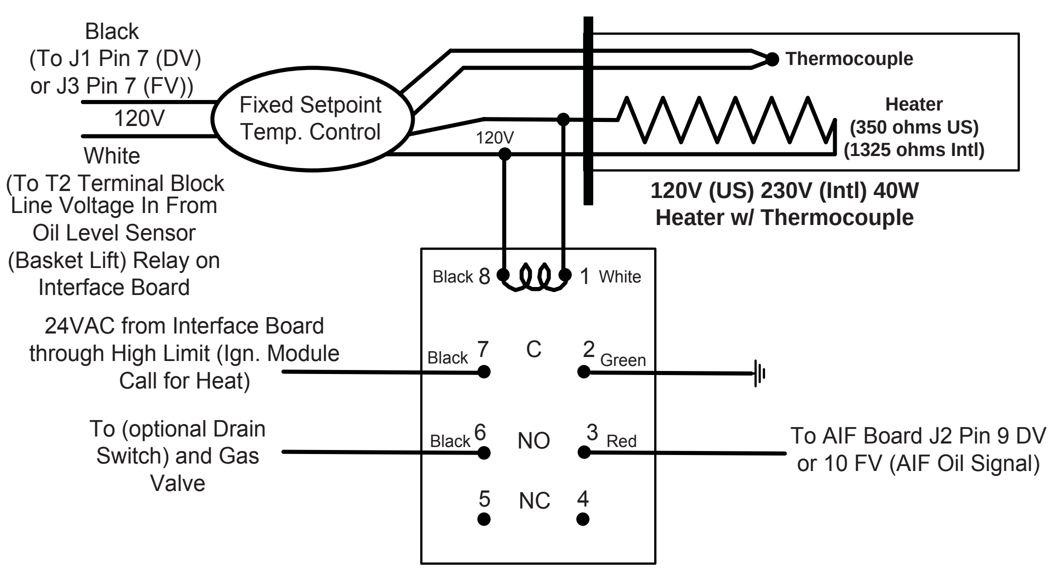
The 120VAC is on T2 in the control box traveling in on pin 11 of J3 and out pin 7 on J1 (DV) or pin 7 on J3 (FV).

Typical sensor-related failures:

- Low temp but no call for heat (heat light),
- Stuck in melt cycle with no call for heat,
- Filter error (IS VAT FULL?) with oil in the filter pan (no oil in the vat).

If the computer doesn't exit melt cycle or continues to display low temp and does not heat, ensure that the gas supply, gas valve, and other components are working properly. If no heat lamp illuminates because no call for heat is initiated, check the following (see diagram below):

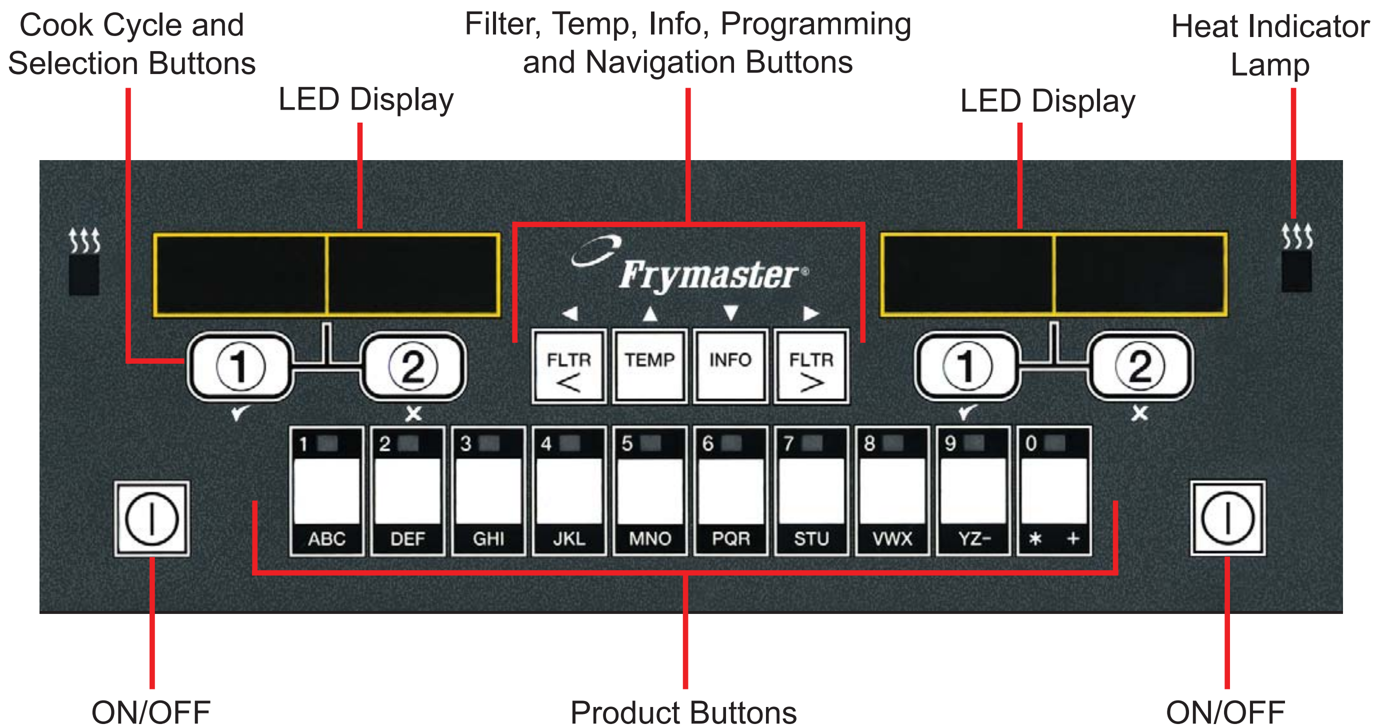
- Power to oil sensor (from previous basket lift relay on interface board K1(DV) or K4 (FV)). Check pin 7 on J1 (DV) or pin 7 on J3 (FV) for 120VAC.
- Power to heater/relay coil on relay board. Check voltage to the coil on pins 8 and 1 to ensure that 120VAC is present with oil in the vat. If the vat is empty, the power will cycle 4 seconds on, 4 seconds off.
- Check between pin 3 and 2; 5VDC for air and 0VDC for oil. A common message for a shorted harness or issue is IS DRAIN CLEAR? with oil in the filter pan.
- Check ground on pin 2 on relay board to stud for a secure ground.
- Check AIF communication harness. Interrupted communication will prevent the fryer from heating.
- If the oil level sensor is cycling 4 sec. on/off and oil is surrounding the sensor, the sensor may have a carbon build up that is self insulating the sensor. Use a no scratch pad to remove carbon build up.



Time Delay Relay Board
DPDT 7sec. Delay on Make

M3000 Computer

Overview

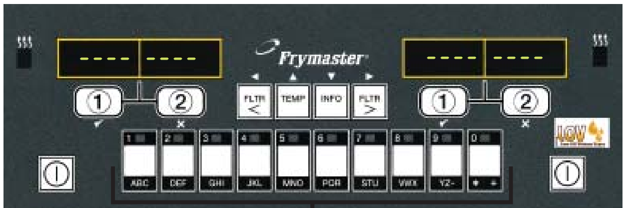


The M3000 computer retains the one-button ease of the M2000 and M100B, combining it with the utility of 40-product menu capability. It will operate with electric and gas fryers, both full- and split-vat.

On single product vats, press any of the cook cycle buttons to begin cooking. On multi-product vats, press a product button, and then a cook cycle button under the display showing the desired product name.

For example, a typical M3000 computer on a 3-vat fry station will display FR FRIES. Pressing one of the cook cycle buttons will begin a cook cycle for French fries.

The chicken/fillet station will usually display dashed lines [----]. Pressing the product button assigned to McChicken, for example, will cause MCCHICK to be displayed. Then, press a cook cycle button beneath the word MCCHICK to start a cook cycle for McChicken.



Product Buttons



Cook Cycle Buttons

Navigation

The M3000 uses ◀ ▶ and ▲ ▼ buttons to navigate the various menus and submenus.

When programming, the left screen shows the menu or submenu item. The right screen is for data entry. Data is entered with alpha-numeric characters, scrolling through lists or by toggling between choices (see diagrams on previous page).

During programming, if a button is not pushed within one minute, the computer returns to operation mode.

Cook Cycle and Selection Buttons

The ✓ and ✕ buttons are dual-function buttons shared with the number 1 and 2 buttons. They are located directly below the LED displays (see diagrams on previous page). Use these buttons to select or cancel functions. The ✕ button is used to back out of and quit submenus.

Filter, Temperature, and Info Buttons

The < FLTR and FLTR > buttons (see diagram) are used to filter the left and right vats of a split vat fryer on demand, while the right FLTR > button is used to filter a full vat on demand. If pressed once, the FLTR buttons will display the number of cook cycles remaining until a filtration prompt. When a FLTR button is pressed twice, the date and time of the last filter will be displayed.

Temp Button

The TEMP button, if pressed once while the fryer is on, displays current vat temperature on both sides. If the TEMP button is pressed twice while the fryer is on, it shows the setpoint temperatures of the vats. If the fryer is off, the display shows the current versions of software.

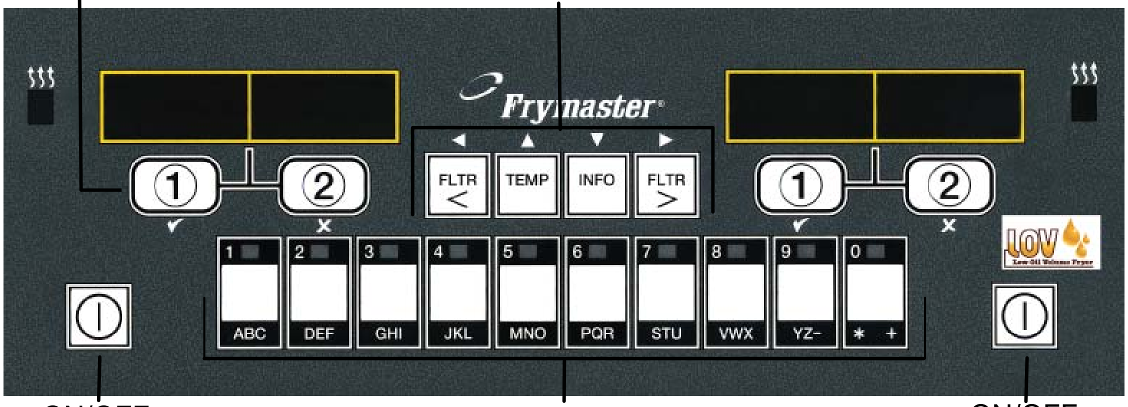
Info Button

The INFO button, if pressed once when the fryer is on, shows the recovery time for each vat from the last test. Recovery displays the time required for the fryer to raise the temperature of the oil 50°F (28°C) between 250°F (121°C) and 300°F (149°C). Maximum recovery time should not exceed 1:40 for electric or 2:25 for gas.

If recovery time exceeds these times, the computer will display RECOVERY FAULT. The error can be cleared and alarm silenced by pressing the ✓ button. The second consecutive time it will display RECOVERY FAULT CALL SERVICE. The error can be silenced and temporarily cleared by pressing the ✓ button. However, each time the fryer is started up and the test performed, the error will continue to appear until code 0042 is entered in tech mode (see page 27).

If the INFO button is pressed and held for three seconds it shows information such as usage, filter statistics and last cook cycles.

Basic Operation



Turn Fryer ON

Press right key for full pot; press key on desired side on a split pot.

Turn Fryer OFF

Press right key for full pot; press key on desired side on a split pot.

Check Frypot Temperature

Press Temp key once. Displays show frypot temperatures.

Check Frypot Setpoint

Press Temp key twice. Displays show frypot setpoint temperatures.

Cancel Duty or Remove Alarm

Press key under active display.

Start One-Button Cook Cycle (Dedicated Mode)

Press key under display showing desired item.

Start Two-Button Cook Cycle (Multi-Product Mode)

Press product key bearing icon for desired product. Press cook channel button to begin cook cycle.

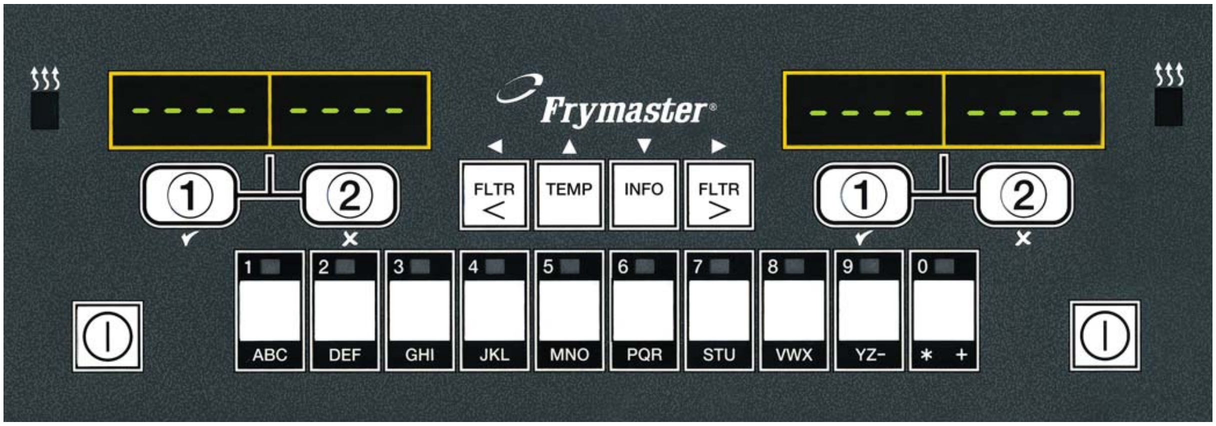
Change From Dedicated to Multi-Product Mode

Press and hold Cook Channel button under displayed menu item for approximately 3 seconds until beep is heard. Display changes to dashed lines.

Change From Multi-Product Mode to Dedicated Mode

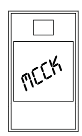
Press product key bearing icon for desired product. Press cook channel button under display showing desired item until beep is heard (approx 3 seconds).

Cooking With Multi-Product Display



1 Dashed lines appear in both displays. - - - - - - - - -

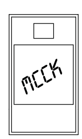
2 Press a product button.



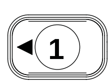
3 Vat with appropriate setpoint displays: MC CHICK. Skip to step 5. MC CHICK

4 Vat with inappropriate setpoint displays: <<<<>>>>

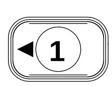
If this occurs, change setpoint by pressing the button assigned to the product. When the chevrons appear, immediately press and hold the cook button until a beep is heard (approximately three seconds) and then release it.



<<<<>>>>



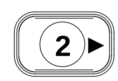
5 Press a cook channel button to begin cook cycle.



6 Display alternates between MCCK and remaining cook time. MC CK ▲▼ 2:34

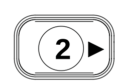
7 If a duty is required for this menu item, DUTY is displayed when it is time to perform a duty, such as shake. DUTY

8 Press cook channel button under duty display to cancel alarm.



9 PULL is displayed when the cook time is complete; an alarm sounds. PULL

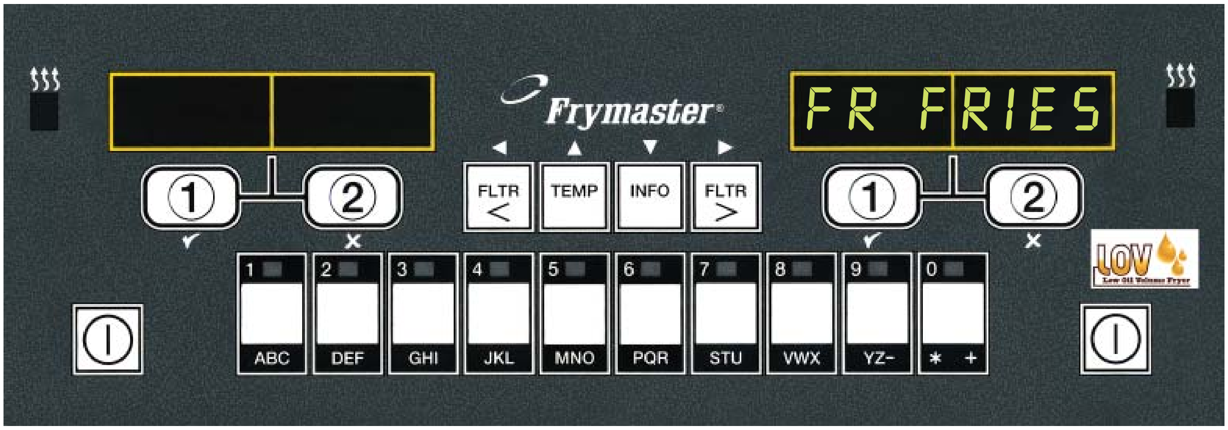
10 Press cook channel button under pull display to cancel alarm.



11 Dashed lines reappear under active display at the end of the cook cycle. - - - - - - -

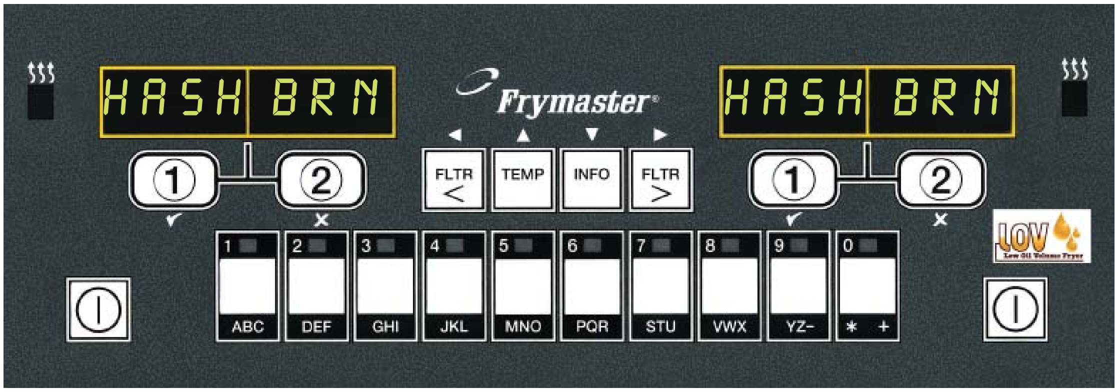
NOTE: If error REMOVE DISCARD PRODUCT appears, press the cook channel button under the message to cancel alarm and remove error message.

Cooking With Dedicated Display

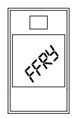


1. A menu item, such as FR FRIES shows in display — FR FRIES
2. Press a cook channel button to begin the cook cycle. — 1
3. Display alternates between abbreviated product name and remaining cook time. — FRY ◄ ► 2:34
4. DUTY is displayed when itis time to shake the fry basket — DUTY
5. Press cook channel button to cancel alarm. — 1
6. PULL is displayed when the cook cycle is complete. — PULL
7. Press cook channel button to cancel alarm. — 1
8. Q 7 is displayed and alternates with FRY. As the quality time counts down. — Q7 ◄ ► FRY; Q1 ◄ ► FRY
9. Pressing the cook channel button now will launch a cook cycle and end the quality countdown. — 1
10. QUAL is displayed when the quality time has elapsed. — QUAL
11. Pressing the cook channel button restores the display to FR FRIES and the unit is ready for cooking — 1; FR FRIES

Changing from Breakfast Setup to Lunch

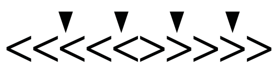


1 Press and quickly release product button for french fries.

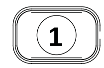


2 Computer will change from HASH BRN to <<<<<>>>>>; an alarm will sound.





3 Press and hold the cook channel button under the display until a beep is heard (approximately three seconds) and release.

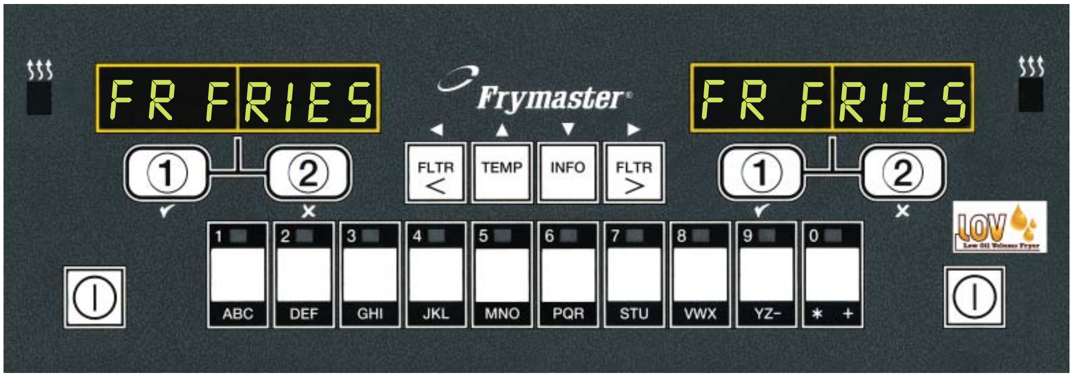


4 Display changes to FR FRIES.



Perform these steps on both sides to change both displays to FR FRIES.

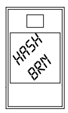
Changing from Lunch Setup to Breakfast



1 Computer displays FR FRIES.

FR FRIES

2 Press and quickly release product button for hash browns.

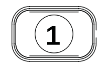


3 Computer display will change from FR FRIES to <<<<<>>>>>; an alarm sounds.

FR FRIES

<<<<<>>>>>

4 Press and hold the cook channel button under the display until a beep is heard (approximately three seconds) and release.



5 Display changes to LOW TEMP until setpoint is reached.

LOW TEMP

6 Display changes to HASH BRN.

HASH BRN

<u>Perform these steps on both sides to change both displays to FR FRIES.</u>

LOV™ Generation II Technical Reference

The following chart maps the menu options available in the M3000 computer and indicates the location of more information on each menu item within the *LOV™ Fryer Installation and Operation Manual*. For more information, consult the indicated section.

M3000 Menu Items	Location in IO manual
Adding New Menu Items	See section 4.10.2
Storing Menu Items in Product Buttons	See section 4.10.3
Draining, Refilling, and Disposing of Oil	See section 4.10.4

- Filter Menu 4.11
  [Press and hold ◄ FLTR or FLTR ►]
  - Auto Filter
  - Maint Filter
  - Dispose
  - Drain to Pan
  - Fill Vat from Drain Pan
  - Fill Vat from Bulk (Bulk Only)
  - Pan to Waste (Bulk Only)
- Programming
  - Level 1 Program 4.12
    [Press and hold TEMP and INFO buttons, 2 beeps, displays Level 1, enter 1234]
    - Product Selection 4.10.2
      - Name
      - Cook Time
      - Temp
      - Cook ID
      - Duty Time 1
      - Duty Time 2
      - Qual Tmr
      - AIF Disable
      - Assign Btn
    - AIF Clock 4.12.1
      - Disabled
      - Enabled
    - Deep Clean Mode 4.12.2
    - High-Limit Test 4.12.3
    - Fryer Setup 4.9
  - Level 2 Program (Manager Level) 4.13
    [Press and hold TEMP and INFO buttons, 3 beeps, displays Level 2, enter 1234]
    - Prod Comp Sensitivity for product 4.13.1
    - E-Log Log of last 10 error codes 4.13.2
    - Password Setup Change passwords 4.13.3
      - Setup [enter 1234]
      - Usage [enter 4321]
      - Level 1 [enter 1234]
      - Level 2 [enter 1234]
    - Alert Tone Volume and Tone 4.13.4
      - Volume 1-9
      - Tone 1-3
    - Filter After Sets number of cooks before filter prompt 4.13.5
    - Filter Time Sets amount of time between filter cycles 4.13.6
  - Tech Mode
    [Press and hold ◄ and ► for 10 seconds, 3 beeps, displays TECH MODE, enter 16501]
    - Clear Passwords
    - Filter Pad Time
- Info Mode 4.14
  [Press and hold INFO for 3 seconds, displays Info Mode]
  - Full/Split Vat Configuration
    - Filter Stats 4.14.1
    - Review Usage 4.14.2
    - Last Load 4.14.3

Loading and Updating Software Procedures

Updating the software takes approximately 20 minutes. To update the software, follow these steps:

1. Switch all computers to OFF. Press the TEMP button to check current M3000/MIB/AIF/ATO software version.

2. Remove the two screws on the left side cover plate of the M3000 board.

3. With the computer folded down, insert the SD card into the slot on the left side of the M3000. The contacts on the card should face down and the notch should appear on the bottom right (see pictures below).

4. Once inserted, UPGRADE IN PROGRESS appears on the left display and WAIT on the right.

5. The display then changes to CC UPDATING on the left and the percentage completed appears on the right. The display counts up to 100 on the right, changing to a flashing BOOT. **DO NOT REMOVE THE CARD UNTIL THE DISPLAY PROMPTS TO DO SO IN STEP 8.**

6. Then, UPGRADE IN PROGRESS is displayed on the left display and WAIT on the right again, followed by COOK HEX, MIB HEX, AIF HEX ending with ATO HEX displayed on the left and the percentage complete on the right.

7. The display then changes to REMOVED SD CARD on the left and 100 on the right.

8. Remove the SD card using the fingernail slot on the top of the SD card.

9. Once the SD card is removed the display changes to CYCLE POWER.

10. Cycle the control power using the hidden reset switch behind the right control box (see page 38). **HOLD THE SWITCH FOR 10 SECONDS ENSURING THE MIB BOARD HAS POWERED FULLY DOWN.**

11. M3000 CAN TX FULL (a SERVICE REQUIRED error) may appear while computers are rebooting. Press YES at the prompt to cancel alarm. A flashing BOOT is displayed on the remaining computers while the program is transferred.

12. When the update is complete, the M3000 displays OFF. The MIB display will remain blank while software is loading, changing to show the vat numbers. Once the LEDs stop blinking, press YES to SYSTEM ERROR FIXED? Enter 1111. The MIB board will display A.

13. Cycle the control power using the hidden reset switch behind the right control box again. **ENSURE THE SWITCH IS HELD FOR 10 SECONDS. WAIT ANOTHER 20 SECONDS UNTIL THE MIB BOARD HAS FULLY RESET BEFORE CONTINUING.**

14. **With the computer displaying OFF, VERIFY software update by pressing the TEMP button to check updated M3000/MIB/AIF/ATO version on each computer. IF ANY BOARDS DID NOT UPDATE, REPEAT THE PROCESS STARTING WITH STEP 3.**

Insert the SD card with contacts facing down.





Remove the SD card using the fingernail slot on the top of the card.

M3000 Troubleshooting

Problem	Probable Causes	Corrective Action
No display on computer.	A. Computer not turned on. B. No power to the fryer. C. Power switch turned off. D. Loose fuse holder. E. Computer has failed. F. Damaged computer wiring harness. G. Power supply component or interface board has failed.	A. Press the ON/OFF switch to turn the computer on. B. This fryer may have two cords: a computer power cord and a main power cord. If the computer cord is not plugged in, the computer will not activate. Verify computer power cord is plugged in and that circuit breaker is not tripped. C. Some fryers have a rocker power switch inside the cabinet below the computer. Ensure the switch is turned on. D. Ensure fuse holder is screwed in properly. E. Swap the computer with a computer known to be good. If computer functions, replace the computer. F. Swap with a harness known to be good. If computer functions, replace the harness. G. If any component in the power supply system (including the transformer and interface board) fail, power will not be supplied to the computer and it will not function.
Computer locks up.	Computer error.	Remove and restore power to the computer.
M3000 display shows FILTER BUSY.	A. Another filtration cycle is still in process. B. Computer error. C. Computer error.	A. Wait until the previous filtration cycle ends to start another filtration cycle. B. A computer has an error. Using the filter menu, try to perform a FILL VAT FROM DRAIN PAN on each vat (see Chapter 4 of the BIELA14 IO manual). Only computers with errors can perform this function with a filter busy error. Computer should clear and return to normal operation once complete. C. If filter busy is still displayed with no activity, ensure the filter pan is empty and remove and restore **ALL** power to the fryer.

Problem	Probable Causes	Corrective Action
M3000 display shows **RECOVERY FAULT CALL SERVICE.**	Recovery time exceeded maximum time limit for two or more cycles.	Silence the alarm by pressing the ✓ button. Clear the error using the code on page 25. Maximum recovery for electric is 1:40.
M3000 display shows **ENERGY MISCONFIGURED**	Wrong energy type selected in setup.	Press 1234 to enter setup and set energy type for electric.
M3000 display shows **EXCEPTION ERROR** with the description on the right.	An error has occurred.	Press 1234 to enter setup and reconfigure the computer.
M3000 displays **SERVICE REQUIRED** **followed by the error**.	An error has occurred.	Press YES to silence alarm. The error is displayed three times. See list of issues on page 26. Fix issue. The computer displays **SYSTEM ERROR FIXED? YES/NO.** Press YES. Computer displays **ENTER CODE.** Enter 1111 to clear error code. Pressing NO will allow the fryer to cook, but error will be redisplayed every 15 minutes.
M3000 display is in wrong temperature scale (Fahrenheit or Celsius).	Incorrect display option programmed.	See page 28 to change temperature scale.
M3000 displays **CHANGE FILTER PAD.**	Filter error has occurred, filter pad clogged, 24 hour filter pad change prompt has occurred, or change filter pad was ignored on a prior prompt.	Change the filter pad and ensure the filter pan has been removed from the fryer for a minimum of 30 seconds. Do NOT ignore **CHANGE FILTER PAD** prompts.
M3000 display shows **INSERT PAN.**	A. Filter pan is not fully inserted into fryer. B. Missing filter pan magnet. C. Defective filter pan switch.	A. Pull filter pan out and fully reinsert into fryer. B. Ensure the filter pan magnet is in place and replace if missing. C. If the filter pan magnet is fully against the switch and computer continues to display **INSERT PAN**, switch is possibly defective.
M3000 display shows **HOT-HI-1.**	Frypot temperature is more than 410ºF (210ºC) or, in CE countries, 395ºF (202ºC).	This in an indication of a malfunction in the temperature control circuitry, including a failure of the high-limit thermostat.
M3000 display shows **HI-LIMIT.**	Computer in high-limit test mode.	This is displayed only during a test of the high-limit circuit and indicates that the high-limit has opened properly.

Problem	Probable Causes	Corrective Action
M3000 display shows LOW TEMP alternating WITH MLT-CYCL.	Frypot temperature is between 180°F (82°C) and 315°F (157°C).	This display is normal when the fryer is first turned on while in the melt cycle mode. To bypass the melt cycle press and hold either #1 or #2 product button under the LCD display until a chirp is heard. The computer displays EXIT MELT alternating with YES and NO. Press the #1 YES button to exit melt. If the display continues, the fryer is not heating.
M3000 display shows ERROR RM SDCRD	Defective SD card.	Replace card with another card.
M3000 display shows TEMP PROBE FAILURE.	A. Problem with the temperature measuring circuitry including the probe. B. Damaged computer wiring harness or connector.	A. This indicates a problem within the temperature measuring circuitry. Check resistance of probe, if faulty replace probe. B. Swap the computer wiring harness with one known to be good. If problem is corrected, replace the harness.
MAINT FILTER (Manual Filter) won't start.	Temperature too low.	Ensure fryer is at setpoint before starting MAINT FILTER.
M3000 display shows REMOVE DISCARD.	In non-dedicated mode, a product is dropped that has a different setpoint that the current vat temperature.	Remove and discard product. Press a cook button under the display with the error to remove the error. Reset the setpoint of the vat before trying to cook product.
M3000 display shows HEATING FAILURE.	Failed computer, failed interface board, open high-limit thermostat.	Turn off the vat with the problem. This error is displayed if the fryer loses its ability to heat oil. It is also displayed when the oil temperature is above 450°F (232°C) and the high-limit thermostat has opened, halting the heating of the oil.
Computer will not go into program mode or some buttons do not actuate.	Failed computer.	Replace computer
M3000 display shows HI 2 BAD.	Computer in high-limit test mode.	This is displayed during a test of the high-limit circuit to indicate if the high-limit has failed.
M3000 display shows HELP HI-2 or HIGH LIMIT FAILURE.	Failed high-limit.	This is displayed to indicate the high-limit has failed.

Problem	Probable Causes	Corrective Action
M3000 display shows software for only M3000 or MIB but not all boards.	Loose or damaged harness.	Check that all harnesses between M3000's, MIB, AIF and ATO are secure. Ensure 24VDC is present on pins 5 & 6 of J2 on MIB board and on J4 or J5 of AIF board. Check for loose or broken pins/wires. If the problem persists, swap out computer from one bank to another and cycle power on the fryer.
M3000 display shows LOW TEMP, heating indicator cycles on and off normally but fryer does not heat.	A. Three phase power cord unplugged or circuit breaker is tripped. B. Failed computer. C. Damaged computer wiring harness. D. Open connection in high-limit circuit.	A. Ensure all cords are fully seated in the receptacles, locked into place and that circuit breakers are not tripped. B. Replace computer. C. Replace computer wiring harness. D. Check high limit circuit starting at the control box connector working to the high-limit.
M3000 display shows IS VAT FULL? YES NO.	A filter error has occurred due to dirty or clogged filter pad or paper, clogged filter pump, filter pump thermal overload, improperly installed filter pan components, worn or missing O-rings, cold oil or an actuator problem.	Follow the steps in the flowchart on page 30.
Fryer filters after each cook cycle.	Filter after setting incorrect or software update issue.	Overwrite the filter after setting by re-entering the filter after value in level two. Ensure that the down arrow is pressed after entering the value to save the setting (see Chapter 4 in the BIELA14 IO Manual for more information).

M3000 Useful Codes

To enter any of the following codes: Press and hold ◂ and ▸ simultaneously for **TEN** seconds; three chirps sounds. The computer displays TECH MODE. Enter the codes below to perform this function.

- **0042 – Reset RECOVERY FAULT CALL SERVICE.**
- **1658 – Change from F° to C°.** The computer displays OFF. Turn the computer on and check temperature to see the temperature scale. If the desired scale is not displayed, repeat.
- **3322 – Reset Factory Menu.** The computer displays COMPLETE, and then OFF. (**NOTE**: This will delete any hand-entered menu items.)
- **1650 – Enter Tech Mode.** See page 1-36 to reset passwords and change filter pad time.
- **1212 – Switch Between Domestic and International Menu.** The computer displays COMPLETE, and then OFF. (**NOTE**: This will delete any hand-entered menu items.)
- **0469 – Reset FILTER STAT DATA.**

The following codes require the removal and reinsertion of the J3 locator plug on the rear of the computer before entering the code.

- **1000 – Reset CALL TECH Message.** Disconnect board locator plug (J10). Reinsert plug. Enter 1000. Computer display switches to OFF. Remove and then restore power to the computer using the 20-pin plug.
- **9988 – Reset BADCRC Message.** Disconnect board locator plug (J10). Reinsert plug. Enter 9988. Computer display switches to OFF. Remove and then restore power to the computer using the 20-pin plug. Replace the computer.

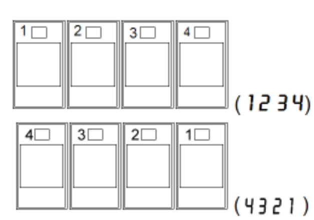
The following codes are entered when prompted to do so or from an energy misconfigured exception error.

- **1111 – Reset SERVICE REQUIRED Message.** Enter this when the issue is fixed and you are prompted to enter.
- **1234 – Enter SETUP MODE from energy misconfigured exception error.** (This usually can be done without pressing the filter buttons if an error is displayed.)

Passwords

To enter level one, level two passwords – Press and hold the **TEMP** and **INFO** buttons simultaneously until LEVEL 1 or LEVEL 2 is displayed. Release the buttons and ENTER CODE appears.

- **1234 – Fryer Setup, Level One, and Level Two.**
- **4321 – Usage Password.**



Service Required Errors

A SERVICE REQUIRED error alternating with YES displays on the computer. After YES is pressed the alarm is silenced. The computer displays an error message from the list below three times with the location of the error. Then, the computer displays SYSTEM ERROR FIXED? YES/NO. If YES is chosen, enter code 1111. If NO is chosen, the system returns to cook mode for 15 minutes then redisplays error until issue is fixed.

Pressing the MIB reset button during any filter function will generate a SERVICE REQUIRED error.

This is a list of the service required errors and cause.

ERROR MESSAGE	EXPLANATION
PUMP NOT FILLING	Oil not returning to vat quickly. Possible problems: dirty pad, bad or missing O-rings, tripped or defective filter pump, actuators or linkage.
DRAIN VALVE NOT OPEN	Drain valve failed to open; the valve's position is unknown.
DRAIN VALVE NOT CLOSED	Drain valve failed to close; the valve's position is unknown.
RETURN VALVE NOT OPEN	Return valve failed to open; the valve's position is unknown.
RETURN VALVE NOT CLOSED	Return valve failed to close; the valve's position is unknown.
MIB BOARD	Problem with CAN communications; check for loose CAN connections. MIB board failure.
AIF BOARD	MIB detects AIF missing; AIF board failure.
ATO BOARD	MIB detects ATO board connection lost; ATO board failure.
HIGH LIMIT FAILURE	High limit circuit has an issue.
AIF PROBE	AIF RTD reading out of range.
ATO PROBE	ATO RTD reading out of range.
TEMP PROBE FAILURE	TEMP Probe reading out of range.
MIB SOFTWARE	Internal MIB software error.
INVALID CODE LOCATION	SD card removed during update.
MISCONFIGURED ENERGY TYPE	Energy type in fryer setup is incorrect; set proper energy type gas or electric. Press 1234 to enter setup to properly configure fryer.
RTC INVALID DATE	The date is invalid. Press 1234 to enter setup to properly configure fryer and set proper date.

LOV™ Generation II Technical Reference

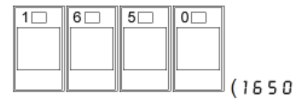
CODE	ERROR MESSAGE	EXPLANATION
E01	REMOVE DISCARD (Right)	A product cook is started on the right side of a split vat or in a full vat that has a different setpoint other than the current vat temperature.
E02	REMOVE DISCARD (Left)	A product cook is started on the right side of a split vat or in a full vat that has a different setpoint other than the current vat temperature.
E03	ERROR TEMP PROBE FAILURE	TEMP Probe reading out of range.
E04	HI 2 BAD	High limit reading is out of range.
E05	HOT HI 1	High limit temperature is past more than 410°F (210°C), or in CE countries, 395°F (202°C).
E06	HEATING FAILURE	A component has failed in the high limit circuit such as computer, interface board, contactor or open-high limit.
E07	ERROR MIB SOFTWARE	Internal MIB software error.
E08	ERROR ATO BOARD	MIB detects ATO board connection lost; ATO board failure.
E09	ERROR PUMP NOT FILLING	Oil not returning to vat quickly. Possible problems: dirty pad, bad or missing O-rings, tripped or defective filter pump, actuators or linkage.
E10	ERROR DRAIN VALVE NOT OPEN	Drain valve failed to open; the valve's position is unknown.
E11	ERROR DRAIN VALVE NOT CLOSED	Drain valve failed to close; the valve's position is unknown.
E12	ERROR RETURN VALVE NOT OPEN	Return valve failed to open; the valve's position is unknown.
E13	ERROR RETURN VALVE NOT CLOSED	Return valve failed to close; the valve's position is unknown.
E14	ERROR AIF BOARD	MIB detects AIF missing; AIF board failure.
E15	ERROR MIB BOARD	Cooking computer detects MIB connections lost; check software version on each computer. If versions are missing, check CAN connections between each computer; MIB board failure.
E16	ERROR AIF PROBE	AIF RTD reading out of range.
E17	ERROR ATO PROBE	ATO RTD reading out of range.
E18	Not Used	
E19	M3000 CAN TX FULL	Connection between computers lost.
E20	INVALID CODE LOCATION	SD card removed during update.
E21	FILTER PAD PROCEDURE ERROR (Change Filter Pad)	25 hour timer has expired or dirty filter logic has activated.
E22	OIL IN PAN ERROR	The MIB has detected oil may be in the pan.
E23	CLOGGED DRAIN (Gas)	Vat did not empty during filtration.
E24	OIL RETURN (level) SENSOR FAILED (Gas)	Oil return sensor may have failed.
E25	RECOVERY FAULT	Recovery time exceeded maximum time limit.
E26	RECOVERY FAULT CALL SERVICE	Recovery time exceeded maximum time limit for two or more cycles.
E27	LOW TEMP ALARM	Oil temperature has dropped lower than 15°F (8°C) in idle mode or 45°F (25°C) in cook mode.

Tech Mode

Tech mode allows technicians to reset all passwords set in Levels One and Two and change the time at which the fryer calls for a filter pad change. The default is 25 hours.



1. Press and hold ◀ and ▶ simultaneously for **TEN** seconds until a third chirp is heard and CODE is displayed.



2. Enter 1650.

3. The computer displays TECH MODE and changes to CLEAR PASS-WORDS.



4. Press the ✓ (**1**) button to accept selection and clear the passwords.

5. The computer displays CLEAR PASSWORDS on the left and COM-PLETE on the right. This clears any passwords set up under levels one and two.

6. Press the ▼ button to toggle to FILTER PAD TIME on the left and 25 on the right. (25 hours is the default time to change the pad.)



7. Press the × (**2**) button to accept changes and exit.

8. The computer displays OFF. Continue below to enter the setup mode.

Fryer Setup Mode

Fryer Setup Mode is used to setup the time, date, date format, language, fryer type, vat type, oil system type, and temperature scale in the fryer's computer. These settings are needed for the fryer to function properly and should only be changed by a technician upon initial power up after installing a new computer or after accessing from Level 1.

With the computer displaying OFF:

1. Enter Level 1 programming mode by pressing the **TEMP** and **INFO** buttons simultaneously until LEVEL 1 is displayed. The computer displays ENTER CODE.



2. Enter 1234.

The computer displays LEVEL 1 PROGRAM for three seconds changing to PRODUCT SELECTION.



3. Press the ▲ button once to scroll to FRYER SETUP.

4. Press the ✓ (1 YES) button.



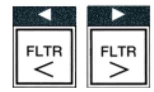
The computer displays ENTER CODE.

5. Enter 1234.



The computer displays LANGUAGE on the left and ENGLISH on the right.

6. Use the ◀ and ▶ buttons to scroll through the language menu.



7. With the desired language selection displayed, press the ✓ (1 YES) button.



The computer displays TEMP FORMAT on the left and F on the right.

8. Use the ◀ and ▶ buttons to toggle between F and C temperature scales.



NOTE: F is used for Fahrenheit, **C** is used for Celsius.

9. With the desired selection displayed, press the ✓ (1 YES) button. The computer displays TIME FORMAT on the left and 12 HR on the right.



10. Use the ◀ and ▶ buttons to toggle between 12 HR and 24 HR.

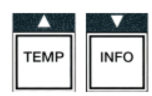


11. With the desired selection displayed, press the ✓ (1 YES) button .



The computer displays ENTER TIME on the left and current time on the right in HH:MM format. AM or PM is displayed if 12 hour system is chosen. For example:

12 Hour Format – 7:30 AM is entered as 0730.
24 Hour Format – 2:30 is entered as 1430.
Change AM and PM – use the ▲▼ buttons.



12. Enter time in hours and minutes using the number buttons 0-9.

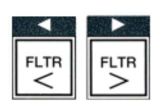


13. With the desired selection displayed, press the ✓ (1 YES) button.



The computer displays DATE FORMAT on the left and US on the right.

14. Use the ◀ and ▶ buttons to toggle between US and INTERNTL.



15. With the desired selection displayed, press the ✓ (1 YES) button.



The computer displays ENTER DATE on the left and MM-DD-YY or DD-MM-YY on the right changing to the current date. For example:

US Format – Dec. 5, 2008 is entered as 120508.
International Format – 5 Dec. 2008 is entered as 051208.

16. Enter the date using the number buttons 0-9.

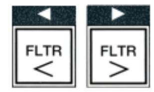


17. With the desired selection displayed, press the ✓ (1 YES) button.



The computer displays FRYER TYPE on the left and ELEC on the right.

18. Use the ◀ and ▶ buttons to toggle between ELEC and GAS.

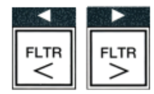


19. With the desired selection displayed, press the ✓ (1 YES) button.



The computer displays VAT TYPE on the left and SPLIT on the right.

20. Use the ◀ and ▶ buttons to toggle between SPLIT and FULL.



21. With the desired selection displayed, press the ✓ (1 YES) button.



The computer displays OIL SYSTEM on the left and JIB on the right.

22. Use the ◀ and ▶ buttons to toggle between JIB and BULK.

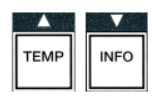


> **NOTE:** A JIB system uses a disposable JIB (Jug in a Box). A BULK system has large storage oil tanks that are connected to the fryer that fills a reservoir.

23. With the desired selection displayed, press the ✓ (1 YES) button.



The computer displays LANGUAGE on the left and ENGLISH on the right. Use the ▲▼ buttons to scroll and edit any additional fields.

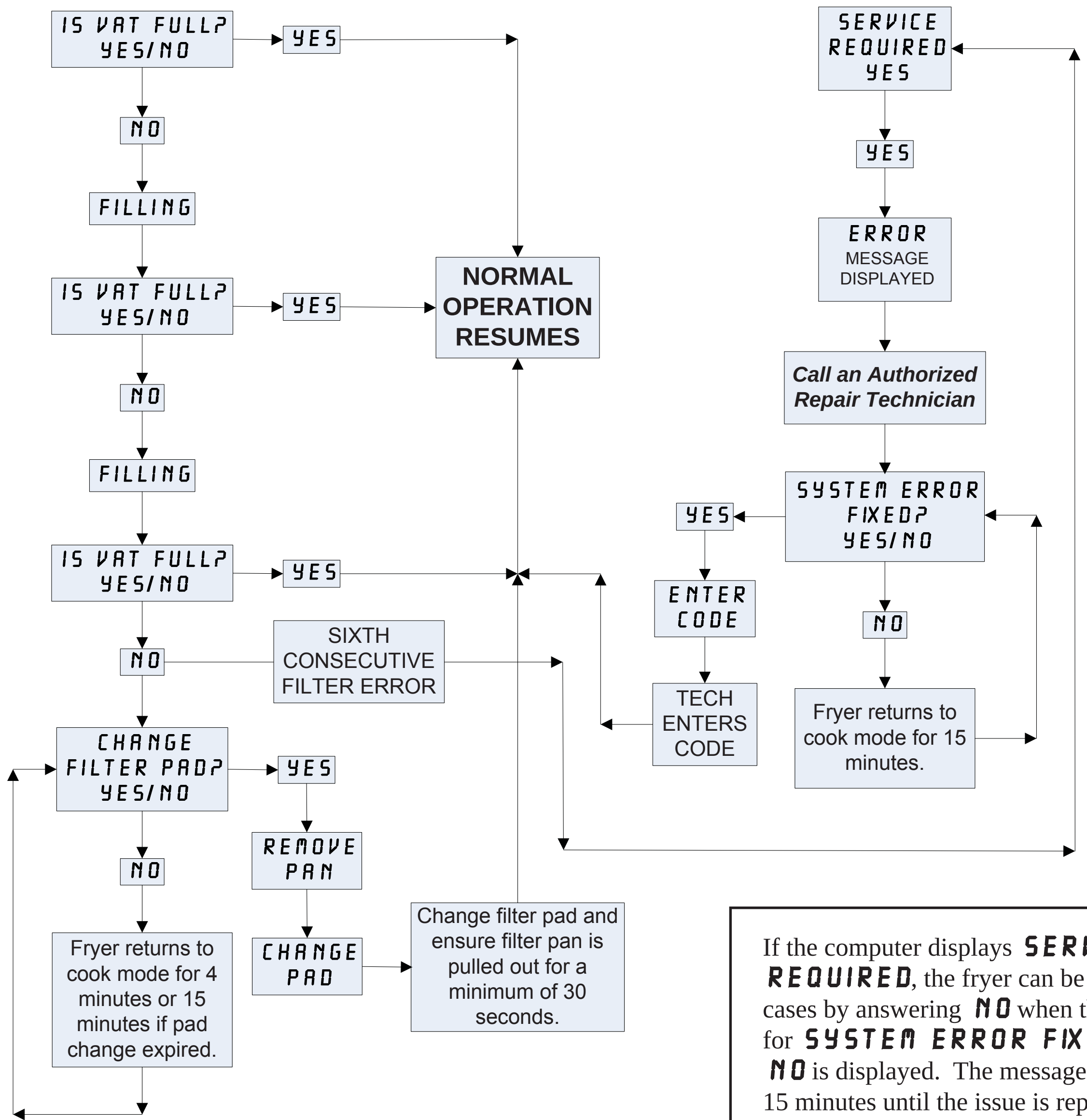


24. Press the ✕ (2) button to exit.



The computer displays SETUP COMPLETE changing to OFF.

Filter Error Flow Chart



If the computer displays **SERVICE REQUIRED**, the fryer can be used in most cases by answering **NO** when the prompt for **SYSTEM ERROR FIXED? YES NO** is displayed. The message repeats every 15 minutes until the issue is repaired and error cleared by a technician. To clear the error, enter 1111 after answering **YES** when **SYSTEM ERROR FIXED? YES NO** is displayed.

This chart follows the process of clearing a **FILTER ERROR** prompt. The prompt is displayed when any of the following occur:

1. a clogged filter pad,
2. a tripped or defective filter pump,
3. a leaky O-ring on the pick up tube,
4. a clogged pressure switch (gas fryer),
5. a failed drain valve/actuator, or
6. a failed return valve/actuator.

It is cleared by following the prompts.

RTI-equipped Systems

Some stores may be equipped with RTI oil storage systems. If so, some of the settings, wiring, and troubleshooting may differ from normal LOV™ fryer systems. (See next page for bulk oil wiring.)
The LOV™ fryer will ONLY operate with RTI systems that have the new RTI updated three-pole float switch. If the float switch is the older two-pole switch, call RTI. These float switches are polarity specific and may short to ground and damage an MIB board.

Normal AC Voltage Measurements (MIB J6 8 pin connector with everything connected)

- Pin 1 to Pin 2 - 24 VAC.
- Pin 2 to Pin 8 - 24 VAC when waste tank is full, 0 VAC when it is not full.
- Pin 2 to Pin 3 - 24 VAC when RTI fill pump is on, 0 VAC when it is off.

Troubleshooting

The valves and pump should be off while MIB is resetting. If any of the valves or pumps are on during reset then the MIB board is bad or wires are shorted.

If JIB valve is not opening, measure when JIB valve supposed to be open:

- Voltage at MIB board from Pin 1 to Pin 2 should be 24 VAC; if not, check connections from RTI 24VAC transformer and check transformer.

JIB solenoid is not opening:

Take these readings when the JIB valve is in the open position:

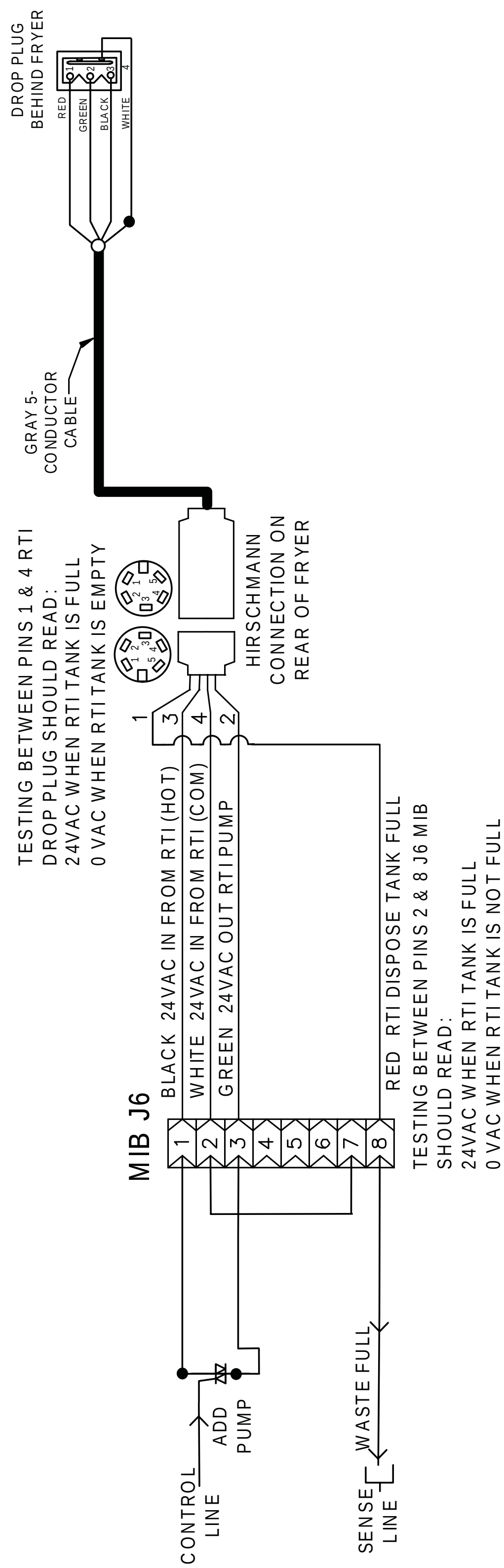
1. Reset the power; wait 60 seconds and see if the valve opens.
2. Check voltage at ATO board on J8. Pin 9 to Pin 16 should be 24 VAC.

RTI pump is not operating or JIB is not filling:

1. Voltage at MIB board from Pin 1 to Pin 2 should be 24 VAC; if not, check connections from RTI 24VAC transformer and check transformer at RTI.
2. Voltage at MIB board from Pin 2 to Pin 3 should be 24 VAC; if not, check MIB board is bad or wires to pump relay are shorted or both.
3. Voltage at Add pump relay should be 24 VAC; if not, check wiring from MIB board. Relay located on top of RTI system.

Waste full signal: Pin 2 to Pin 8 should be 24 VAC when full, 0 VAC when not full; if no voltage level change, then the connection from RTI switch or MIB board is bad.

Bulk Oil LOV™ Wiring



Oil Disposal and Fill with RTI-equipped Systems

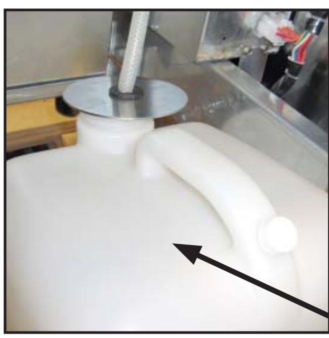
Bulk oil systems have large oil storage tanks, typically located in the rear of the restaurant, that are connected to the rear manifold on the fryer. Waste oil is pumped from the fryer, through the fitting located on the left, and into the disposal tanks. Fresh oil is pumped from the tanks, through the fitting located on the right, and into the fryer (as shown below).

LOV™ fryers equipped for use with bulk oil systems have an onboard fresh oil jug. The same fitting is used for filling the jug and topping off the frypot.

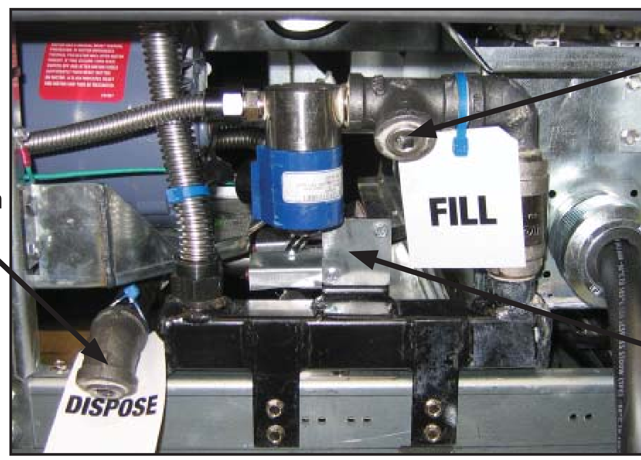
An orange momentary switch located adjacent to the JIB allows the operator to fill the JIB from the bulk oil storage tank. To fill the JIB, press and hold the orange button until the JIB is full then release.

Using the filter menu scroll to DISPOSE and select to dispose using the RTI system. When prompted, open the dispose valve by pulling the handle forward. To close push the handle towards the rear of the fryer until it stops. A key lock allows the store manager to control when oil is disposed.

Warning: Do not add HOT or USED oil to the JIB.



The RTI JIB with fitting.



Fittings, LOV™ Fryer.



Orange JIB reset and momentary fill button.

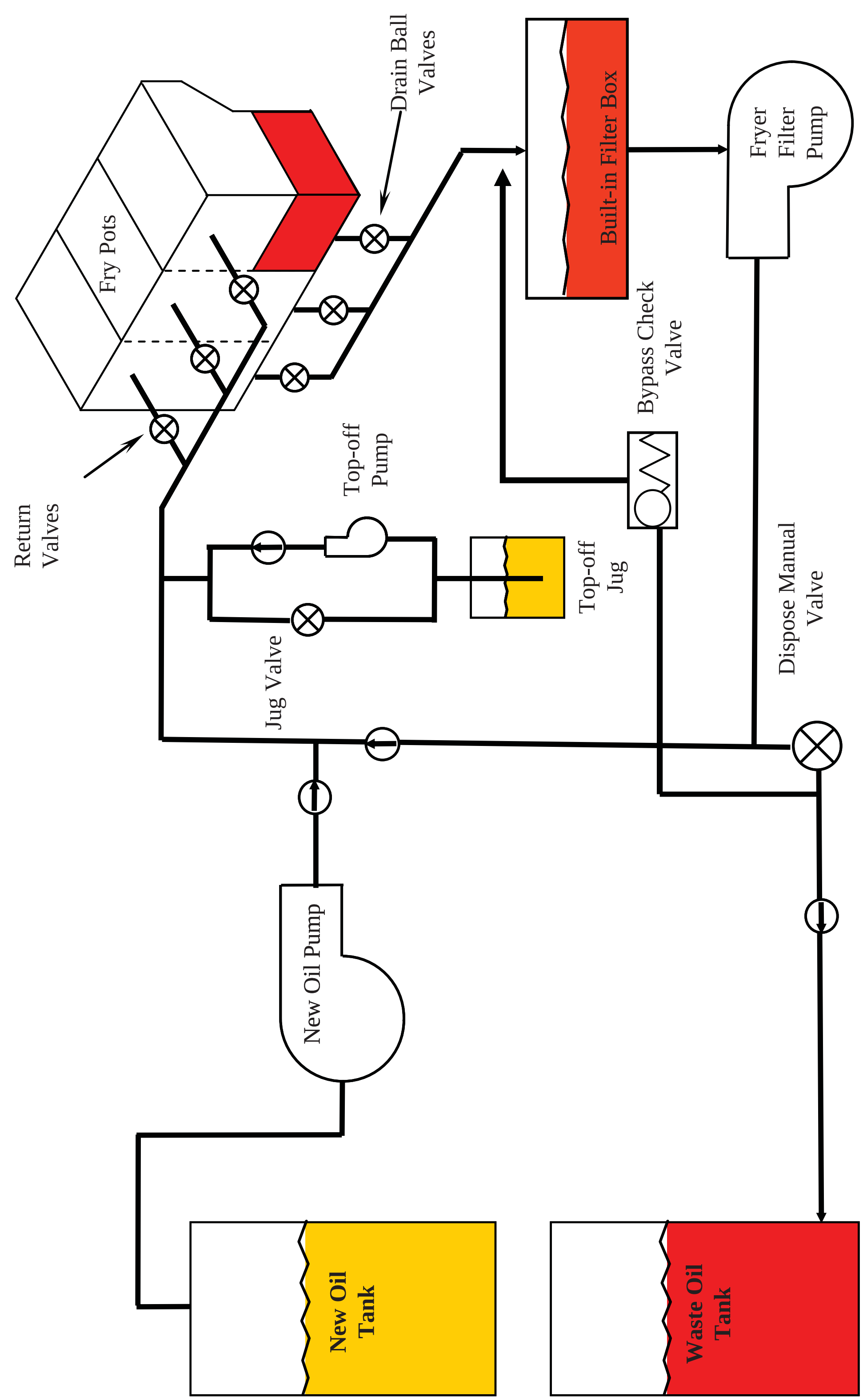


Opening the RTI dispose valve.



Closing the RTI dispose valve.

Frymaster LOV™ Fryer and RTI Bulk Oil System Plumbing Schematic



RTI LOV™ Test Quick Reference

DISPOSE TO WASTE, REFILL VAT FROM BULK:

1. Hold down "Filter" button until computer beeps twice.
2. Scroll down to "Dispose" using "Info" button then press "✓" button.
3. "Dispose? Yes/No" is displayed.*
4. Press "✓" to dispose of oil in pot.
5. "Draining" is displayed.
6. "Vat Empty? Yes" is displayed.
7. Press "✓".
8. "Cln Vat Complete? Yes" is displayed.
9. Press "✓".
10. "Open Dispose Valve" is displayed. Open dispose valve.
11. "Disposing" is displayed for five minutes.
12. "Remove Pan" is displayed. Remove pan.
13. "Is Pan Empty? Yes No" is displayed.
14. Press "✓" if filter pan is empty. Select "✗" if pan still has oil in it.
15. "Close Dispose Valve" is displayed. Close dispose valve.
16. "Insert Pan" is displayed. Insert pan.
17. "Fill Vat From Bulk? Yes/No" is displayed.
18. Press "✓".
19. "Press and Hold Yes to Fill" alternating with "Yes" is displayed.
20. Hold down "✓" to fill pot to desired level.
21. "Filling" is displayed while button is depressed.
22. "Continue Filling Yes/No" is displayed
23. Press "✓" to continue filling or "✗" to Exit program.

*__NOTE__: If the waste tank is full, the computer displays "RTI Tank Full." Call RTI.

DISPOSE TO WASTE:

1. Hold down "Filter" button until computer beeps twice.
2. Scroll down to "dispose" using "Info" button and press "✓" button.
3. "Dispose? Yes/No is displayed.
4. Press "✓".
5. "Draining" is displayed.
6. "Vat Empty? Yes is displayed.
7. Press "✓"
8. "Cln Vat Complete? Yes" is displayed.
9. Press "✓".
10. "Open Dispose Valve" is displayed.
11. Open dispose valve by pulling completely forward to start disposal.
12. "Disposing" is displayed for four minutes.
13. "Remove Pan" is displayed.
14. Slide the filter pan slightly out of the fryer.
15. "Is Pan Empty? Yes/No" is displayed.
16. Press "✓" if the filter pan is empty. Select "✗" if pan still has oil in it.
17. "Close Dispose Valve" is displayed.
18. Close the dispose valve ensuring the handle is pushed completely towards the fryer.
19. "Insert Pan" is displayed.
20. "Fill Vat From Bulk? Yes/No" is displayed.
21. Press "✗" if you wish to leave pot empty and exit.

FILL VAT FROM BULK:

1. Hold down "filter" button until computer beeps twice.
2. Scroll down to "Fill Vat from Bulk" using the Info button.
3. Press "✓".
4. "Fill Vat from Bulk? Yes/No" is displayed.
5. Press "✓".
6. "Press and Hold Yes to Fill / Yes" is displayed.
7. Press and hold down "✓" to fill pot to desired level.
8. "Filling" is displayed during fill.
9. Release button to stop filling.
10. "Continue Filling? Yes/No" is displayed.
11. Press "×" to exit.

FILL JUG FROM BULK:*

1. When "Orange" indicator light is on, the top-off jug is empty.
2. To refill jug press and hold the orange reset button above the jug until the jug is full.
3. Release the button to stop filling.

***NOTE: The jug may not fill if any of the following are in progress:**

If FILTER NOW? YES/NO, CONFIRM YES/NO, or SKIM VAT is displayed, the fill jug button is disabled until either a filter is complete or until no is chosen.

The system also checks these conditions. The following must be met before jug fill is allowed:

Solenoid closed –

- Orange fill button pressed longer than 3 seconds.
- Waste valve closed.
- FILTER NOW? YES/NO, CONFIRM YES/NO, or SKIM VAT cannot be displayed.
- System power cycle (all boards – computers, MIB, AIF and ATO) after changing setup from JIB to Bulk (use momentary reset).
- No filtration or other filter menu selection can be in process.

Other factors that may not allow fill jug from bulk –

- Defective solenoid.
- Defective switch.
- RTI pump issue.
- RTI relay stuck.

If using two fryer systems that are both attached to the RTI system, they may not be able to fill both units at the same time if they have an RTI unit with a single head. Some RTI units have dual heads which can fill simultaneously.

Board and Computer Replacement

Readdress All Boards



It is necessary to readdress any replaced boards by resetting all power to the entire fryer battery system.

The control power reset switch is a momentary rocker switch located behind the control box above the JIB that resets all power to all the computers and boards in the fryer. Press and hold the switch for at least **10 seconds** when resetting the control power to ensure power has sufficiently drained from boards. After releasing the momentary control power reset switch, wait at least 20 seconds until the MIB board has completely reset and all LEDs have stopped blinking before starting a function.

ATO Board, LON Gateway, ATO Pump Relay, and Transformer Replacement

The LON gateway and ATO board are located inside the box behind the JIB. The LON gateway covers the ATO board and must be removed to access it. Both are connected to single phase power from the control box.

1. Disconnect the fryer from the electrical power supply.
2. Locate the ATO box behind the JIB (Jug In Box).
3. Remove the cover to expose the transformers, relay, and LON gateway (if installed; see image below, left).
4. Mark and unplug any wires or harnesses.
5. Once the LON gateway is removed, the ATO board is visible (see image below, right).
6. Replace the defective component and reattach all wires or harnesses.
7. Replace the cover.
8. **CYCLE POWER TO ENTIRE FRYER SYSTEM (see section above).**
9. Press the TEMP button on one of the M3000 computers to verify software version of the ATO. If the version is not visible, the ATO may not be connected properly.



ATO box interior, with LON gateway still installed.

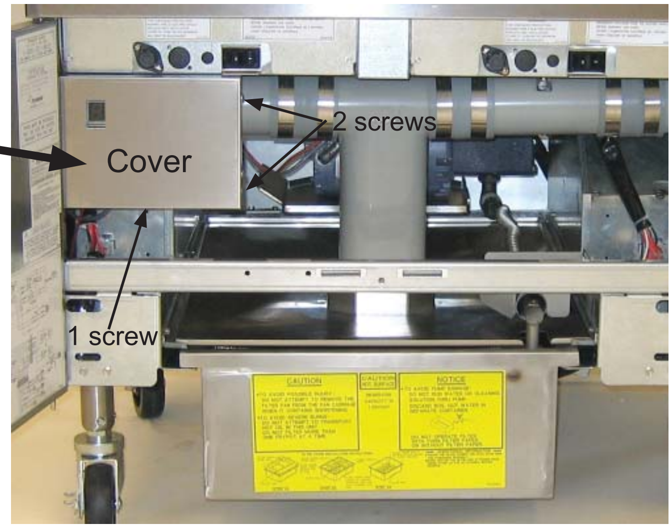


ATO box interior, with LON gateway removed to expose ATO board.

MIB Replacement

The MIB controller is located inside the left cabinet (see image below). In normal operation, a cover hides the MIB controls. The LED display is visible.

1. Disconnect the fryer from the electrical power supply.
2. Remove the three torx screws from the MIB cover, exposing the MIB board (see image at right).
3. Remove the screw in the center top will allow the board to hinge down and expose the connections on the back of the board.
4. Disconnect the MIB board by carefully removing the plugs on the rear of the board (see image at right).
5. Replace with a new MIB board and reverse steps to reassemble.
6. Once replaced, reconnect the power.
7. Cycle all power to the unit to readdress the fryer using the steps on the previous page.

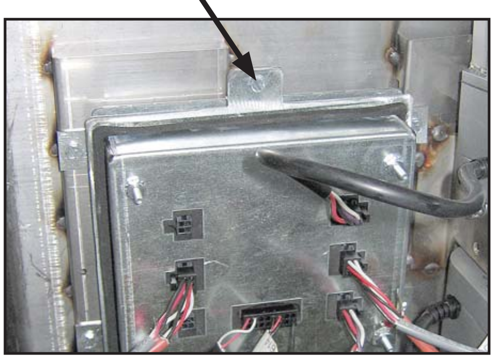


MIB controller cover (three screws hold it in place).

AIF Replacement

The AIF boards are located inside a protective housing underneath each frypot.

1. Disconnect the fryer from the electrical power supply.
2. Locate the AIF board to be replaced under a frypot.
3. Mark and unplug the harnesses.
4. Locate the screw on the front of the AIF assembly holding it in place.
5. Remove the screw and the front of the assembly drops down and the back tab slides out of the bracket attached to the frypot (see below).
6. Reverse steps to reassemble, ensuring that the new AIF assembly slides into the slot in the rear of the bracket.
7. Cycle all power to the unit to readdress the fryer using the steps on the previous page.


Remove this screw that secures the AIF board to the fryer.


After removing the screw, the AIF assembly drops down.


The bottom tab slides out of the bracket attached to the frypot.

M3000 Computer Replacement

The M3000 computer is located on the front of the fryer.

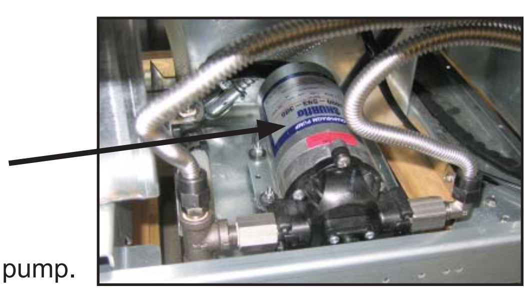
1. Disconnect the fryer from the electrical power supply.
2. The controller bezel is held in place by tabs at the top and bottom. Slide the metal bezel up to disengage the lower tabs. Then slide the bezel down to disengage the upper tabs.
3. Remove the two screws from the upper corners of the control panel. The control panel is hinged at the bottom and will swing open from the top.
4. Unplug the wiring harnesses from the connectors on the back of the computer, marking their position for reassembly, and disconnect the grounding wires from the terminals. Remove the computer assembly by lifting it from the hinged slots in the control panel frame.



5. Install the replacement computer. Reinstall the control panel assembly by reversing steps 1 thru 4.
6. Setup the computer following the instructions on page 4-9 in the Installation and Operation manual. Setup MUST be performed after replacement.
7. Cycle all power to the unit to readdress the fryer using the steps on page 37.

ATO Pump Replacement

1. Disconnect the fryer from the electrical power supply.
2. Locate the ATO pump, behind the ATO box. Mark and unplug any wires or harnesses.
3. Press up from the bottom on the quick disconnects to release the plumbing. The plumbing can be pulled from the pump.
4. Loosen the four nuts attaching the pump to the pump tray.
5. Replace the defective component and reverse above steps, and then reconnect power.


ATO pump.


Quick disconnect.

Wiring Diagrams

LOV™ Electric Fryer

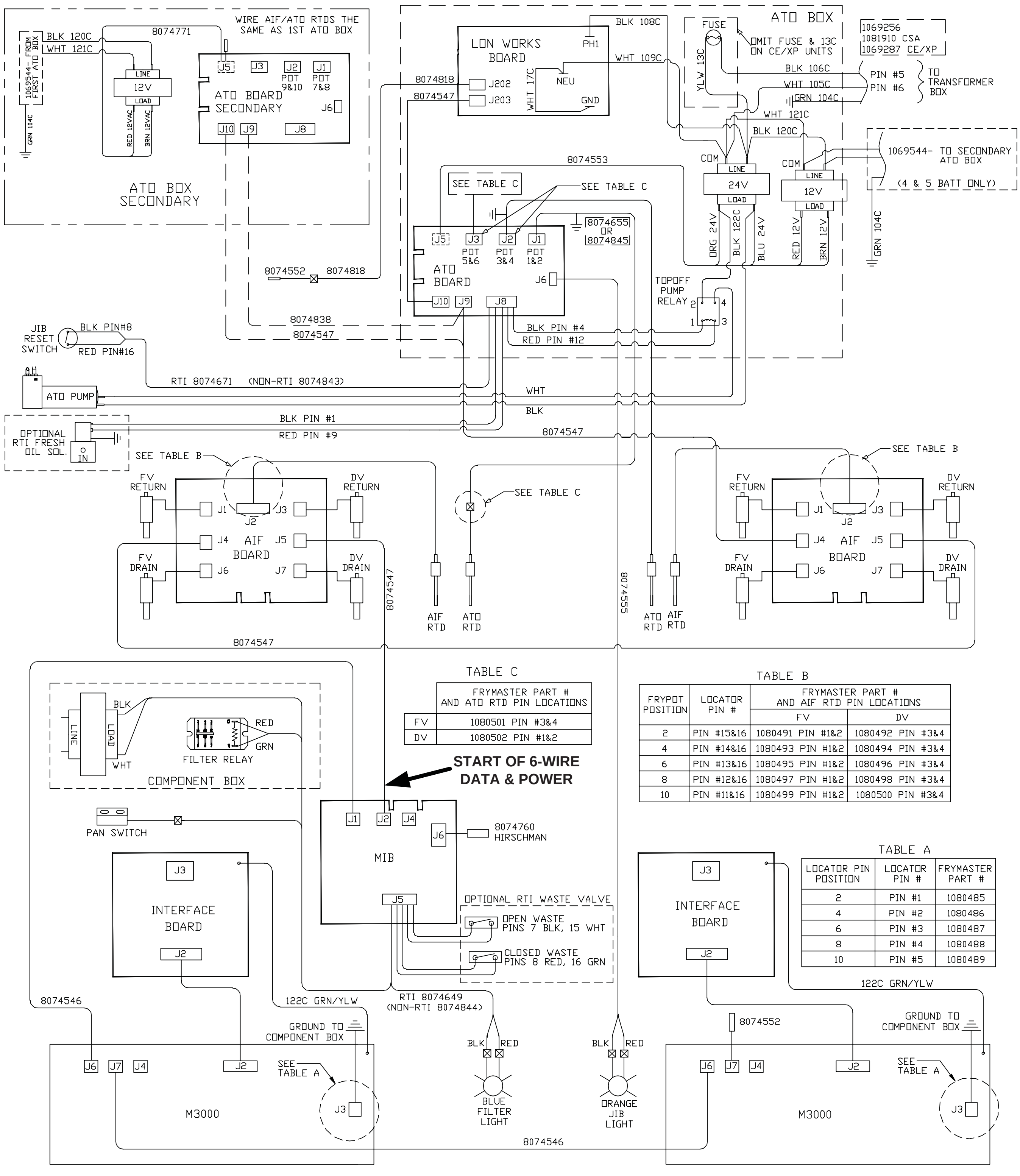


TABLE C

	FRYMASTER PART # AND ATO RTD PIN LOCATIONS
FV	1080501 PIN #3&4
DV	1080502 PIN #1&2

TABLE B

FRYPOT POSITION	LOCATOR PIN #	FRYMASTER PART # AND AIF RTD PIN LOCATIONS FV	DV
2	PIN #15&16	1080491 PIN #1&2	1080492 PIN #3&4
4	PIN #14&16	1080493 PIN #1&2	1080494 PIN #3&4
6	PIN #13&16	1080495 PIN #1&2	1080496 PIN #3&4
8	PIN #12&16	1080497 PIN #1&2	1080498 PIN #3&4
10	PIN #11&16	1080499 PIN #1&2	1080500 PIN #3&4

TABLE A

LOCATOR PIN POSITION	LOCATOR PIN #	FRYMASTER PART #
2	PIN #1	1080485
4	PIN #2	1080486
6	PIN #3	1080487
8	PIN #4	1080488
10	PIN #5	1080489

LOV™ Gas Fryer

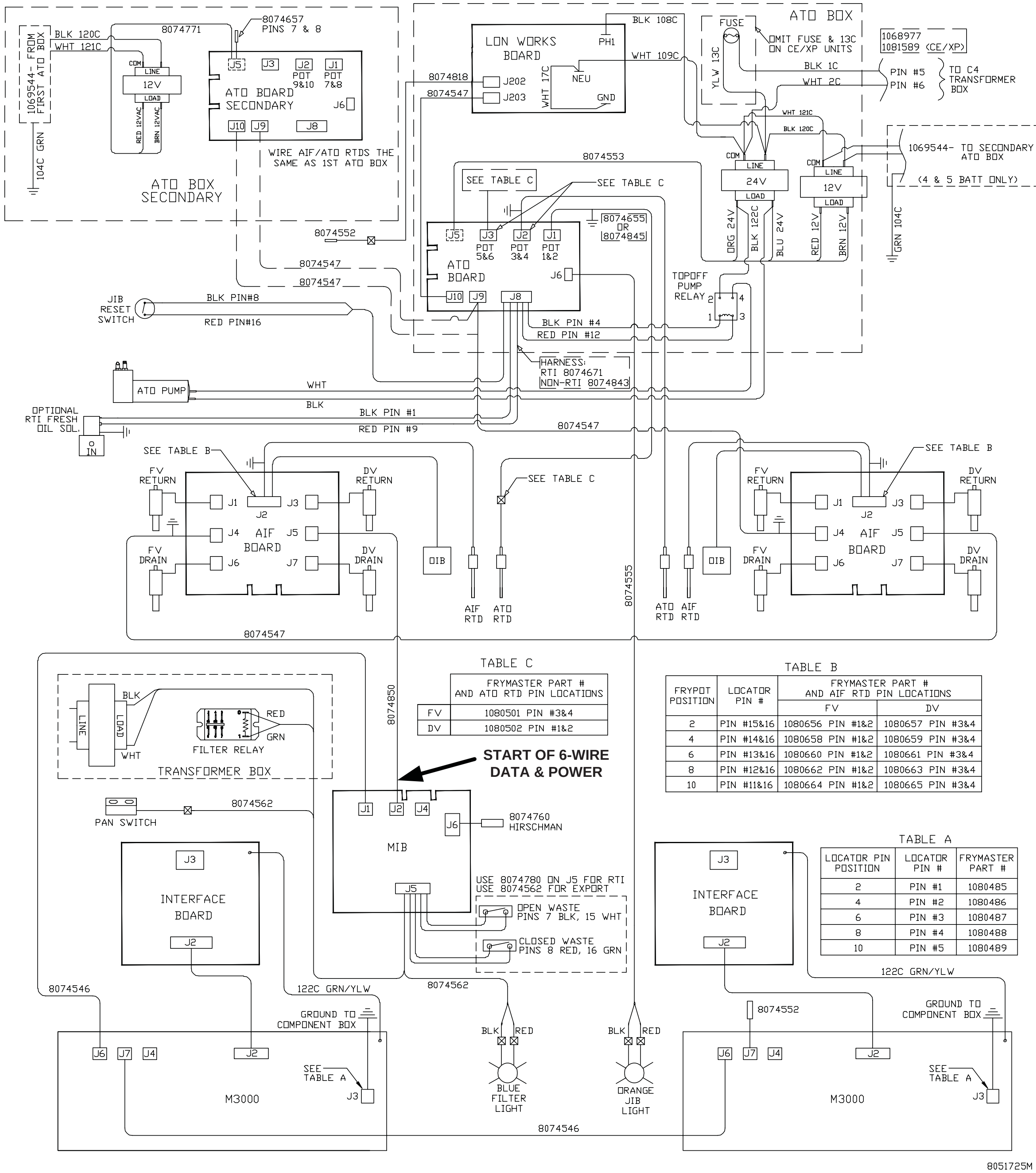


TABLE C

	FRYMASTER PART # AND ATO RTD PIN LOCATIONS
FV	1080501 PIN #3&4
DV	1080502 PIN #1&2

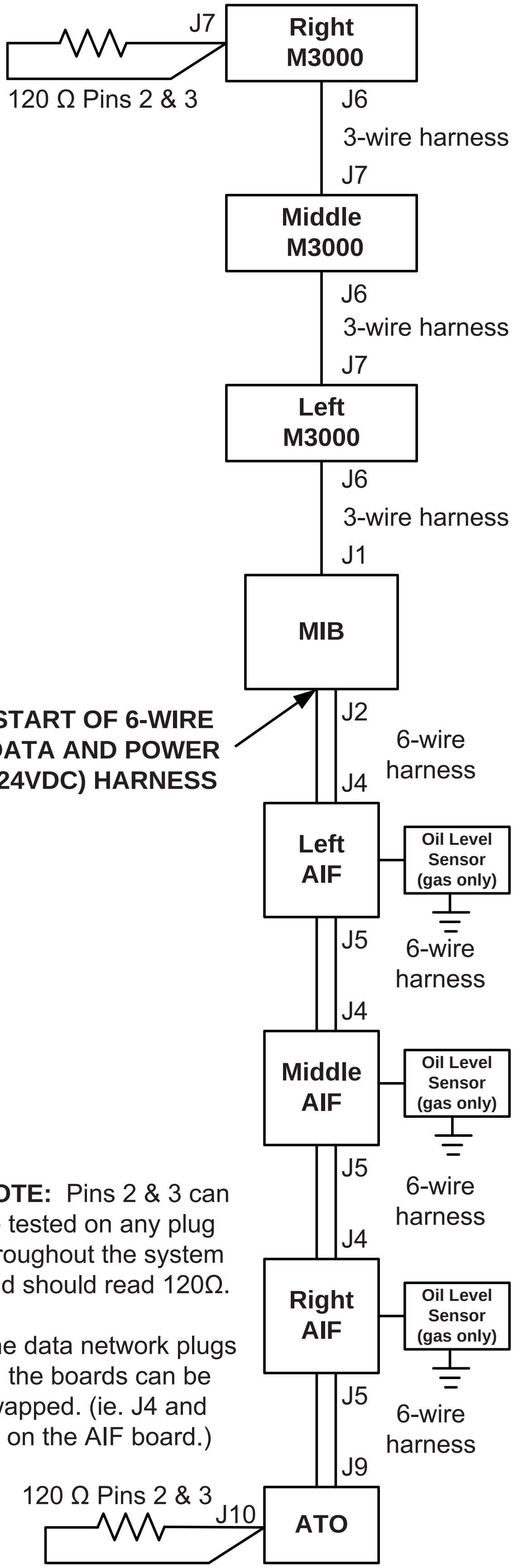
TABLE B

FRYPOT POSITION	LOCATOR PIN #	FRYMASTER PART # AND AIF RTD PIN LOCATIONS	
		FV	DV
2	PIN #15&16	1080656 PIN #1&2	1080657 PIN #3&4
4	PIN #14&16	1080658 PIN #1&2	1080659 PIN #3&4
6	PIN #13&16	1080660 PIN #1&2	1080661 PIN #3&4
8	PIN #12&16	1080662 PIN #1&2	1080663 PIN #3&4
10	PIN #11&16	1080664 PIN #1&2	1080665 PIN #3&4

TABLE A

LOCATOR PIN POSITION	LOCATOR PIN #	FRYMASTER PART #
2	PIN #1	1080485
4	PIN #2	1080486
6	PIN #3	1080487
8	PIN #4	1080488
10	PIN #5	1080489

Data Network Flow Chart



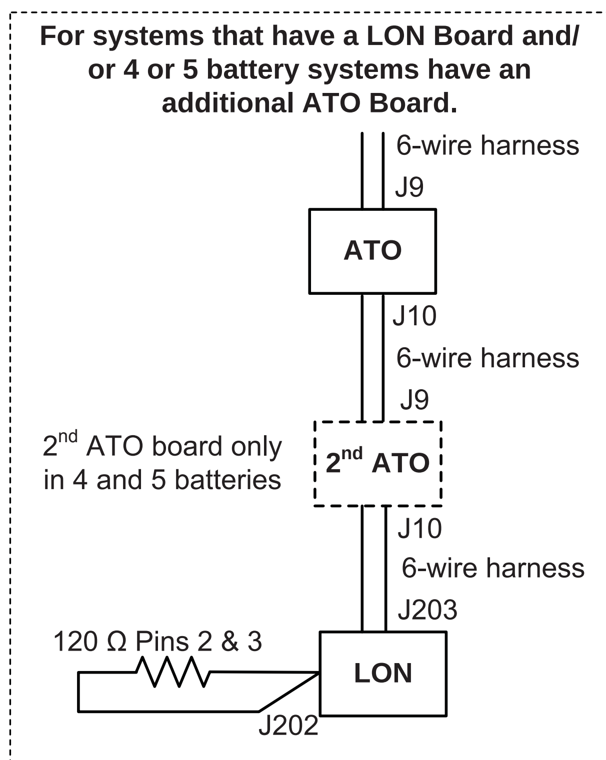
NOTE: Pins 2 & 3 can be tested on any plug throughout the system and should read 120Ω.

The data network plugs on the boards can be swapped. (ie. J4 and J5 on the AIF board.)

Turn each computer to OFF. Press the TEMP button on each computer and verify ALL software versions are present (M3000, MIB, AIF, ATO and LON on US only). A missing version may indicate an open connection. Connections from the MIB to the AIF boards carry 24VDC on the gray cable.

Harness	Pin #	Function	Voltage	Wire Color
3-wire harness	1	Ground		Black
	2	CAN Lo		Red
	3	CAN Hi		White
	4	NOT USED		
	5			
	6			

6-wire harness	1	Ground		Black
	2	CAN Lo		Red
	3	CAN Hi		White
	4	5VDC+	5VDC	Black
	5	24VDC	24VDC	Red
	6	Ground		White



Pin Positions

ATO (Automatic Top Off) Pin Positions and Harnesses

Connector	From/To	Harness #	Pin #	Function	Voltage	Wire Color
J8	RTI Add Solenoid	8074671	1	24VAC Ret	24VAC	Black
			2			
			3			
	ATO Pump Relay		4	24VAC Ret	24VAC	Black
			5			
			6			
			7			
	JIB Reset Switch		8	JIB Low Reset	16VDC	Black
	RTI Add Solenoid		9	24VAC	24VAC	Red
			10			
			11			
	ATO Pump Relay		12	24VAC	24VAC	Red
			13			
			14			
			15			
	JIB Reset Switch		16	Ground	16VDC	Red
J4 (Rear) / J5 (Front)	Transformer	8074553	1	24VAC Ret	24VAC	Orange
			2	24VAC		Blue
			3			
			4			
			5	12VAC Ret	12VAC	Red
			6	12VAC		Brown
			7			
			8			
J3 - Vat #3 J2 - Vat #2 J1 - Vat #1	ATO RTD	8074655 - Vat #1 8074654 - Vat #2 8074621 - Vat #3	1	DV - Probe Ground	Ohm	White
			2	DV - Probe		Red
			3	FV - Probe Ground		White
			4	FV - Probe		Red
J6	Orange LED	8074555	1	16VDC	16VDC	Black
			2	16VDC Ret		Red
J7			1			
			2			
			3	Ground		
			4	RB7/DATA		
			5	RB6/CLOCK		
J10	Network Resistor (pins 2 & 3) or to next ATO Board (4 & 5 vat units)	8074552	1	Ground		Black
			2	CAN Lo		Red
			3	CAN Hi		White
			4	5VDC+	5VDC	Black
			5	24VDC	24VDC	Red
			6	Ground		White
J9	AIF J5	8074546	1	Ground		Black
			2	CAN Lo		Red
			3	CAN Hi		White
			4	5VDC+	5VDC	Black
			5	24VDC	24VDC	Red
			6	Ground		White

MIB (Manual Interface Board) Pin Positions and Harnesses

Connector	From/To	Harness #	Pin #	Function	Voltage	Wire Color
J1	M3000 J7	8074546	1	Ground		Black
			2	CAN Lo		Red
			3	CAN Hi		White
			4			
			5			
			6			
J2	AIF J4	8074547	1	Ground		Black
			2	CAN Lo		Red
			3	CAN Hi		White
			4	5VDC+	5VDC	Black
			5	24VDC	24VDC	Red
			6	Ground		White
J5	Transformer	8074649 RTI 8074844 NON-RTI	1	24VAC	24VAC	Black
			2	24VAC Ret		White
	Filter Relay		3	Pump Motor	24VDC	Red
			4	Pump Motor		Green
	Blue LED		5	Blue LED +	24VDC	Red
			6	Blue LED -		Black
	RTI Open Switch		7	Open Switch +		Black
	RTI Closed Switch		8	Closed Switch +		Red
			9			
			10			
	Pan Switch		11	Pan Sw +	24VDC	Black
			12	Pan Sw -		Red
			13			
			14			
	RTI Open Switch		15	Ground -		White
	RTI Closed Switch		16	Ground -		Green
J6	To RTI connection in rear of fryer	8074760	1	From RTI transformer	24VAC	Black
			2	Common		White
			3	To RTI "Add Pump" Relay	24VAC	Green
			4			
			5			
			6			
			7			
			8	From RTI "Waste Tank Full Sensor" Test Pins 2 to 8	24VAC – Full 0VAC – Not Full	Red

MIB (Manual Interface Board) Display Diagnostics

DISPLAY	LED	EXPLANATION
Drain		
Vat # (The vat number is followed by an "L" to indicate left side of a split vat or an "r" to indicate the right side of a split vat or a full vat.)	On	Drain valve on vat # is open.
Vat # (The vat number is followed by an "L" to indicate left side of a split vat or an "r" to indicate the right side of a split vat or a full vat.)	Off	Drain valve on vat # is closed.
Vat # (The vat number is followed by an "L" to indicate left side of a split vat or an "r" to indicate the right side of a split vat or a full vat.)	Blink	Drain valve on vat # is opening or closing or an error condition may exist.
Return		
Vat # (The vat number is followed by an "L" to indicate left side of a split vat or an "r" to indicate the right side of a split vat or a full vat.)	On	Return valve on vat # is open.
Vat # (The vat number is followed by an "L" to indicate left side of a split vat or an "r" to indicate the right side of a split vat or a full vat.)	Off	Return valve on vat # is closed.
Vat # (The vat number is followed by an "L" to indicate left side of a split vat or an "r" to indicate the right side of a split vat or a full vat.)	Blink	Return valve on vat # is opening or closing or an error condition may exist.
Network		
N		Network error, displays for 10 seconds in no communications are received from the M3000 within 10 seconds after power on or MIB reset.
Resetting		
r		An "r" is displayed for ten seconds or until communication is received from the M3000 after a power on or MIB reset.
Miscellaneous		
E alternating with vat # (The vat number is followed by an "L" to indicate left side of a split vat or an "r" to indicate the right side of a split vat or a full vat.)	Blink	The circuit has an issue. Ensure the actuator is plugged in. Ensure the CAN connections are all securely plugged into the connectors.
— — —		Indicates the AIF temperature sensor did not detect a full vat during filtration.
A	Manual LED off	The system is in auto filtration mode.
Vat # (The vat number is followed by an "L" to indicate left side of a split vat or an "r" to indicate the right side of a split vat or a full vat.)	Manual LED on	The system is in manual mode.
P		This will only be displayed in auto filtration mode. Filter pan is improperly seated. Any auto filtration messages received at this time are ignored.

AIF (Auto Intermittent Filtration) Actuator Board Pin Positions

Connector	From/To	Harness PN	Pin #	Function	Voltage	Wire Color
J1	FV Return	N/A	1	Ret + (Open)	24VDC	Black
			2	Ret – (Closed)	24VDC	Red
			3	Ret Position		Purple
			4	Ground		White
J2	FV AIF RTD		1	Ground		White
			2	FV - Temp		Red
	DV AIF RTD		3	Ground		White
			4	DV - Temp		Red
			5			
			6			
			7			
			8			
	Oil Level Sensor (Gas)		9	DV – OLS (Gas)		Black
			10	FV – OLS (Gas)		Red
	Locator Pin		11	Locator Vat #5		Black
			12	Locator Vat #4		
			13	Locator Vat #3		
			14	Locator Vat #2		
			15	Locator Vat #1		
	Locator		16	Locator Signal		Black
J3	DV Return	N/A	1	Ret + (Open)	24VDC	Black
			2	Ret – (Closed)	24VDC	Red
			3	Ret Position		Purple
			4	Ground		White
J4	MIB J2 or AIF J5	8074547 AIF Board Communication and Power	1	Ground		Black
			2	CAN Lo		Red
			3	CAN Hi		White
			4	5VDC+	5VDC	Black
			5	24VDC	24VDC	Red
			6	Ground		White
J5	AIF J4 or ATO J10	8074547 AIF Board Communication and Power	1	Ground		Black
			2	CAN Lo		Red
			3	CAN Hi		White
			4	5VDC+	5VDC	Black
			5	24VDC	24VDC	Red
			6	Ground		White
J6	FV Drain	N/A	1	Drain + (Open)	24VDC	Black
			2	Drain – (Closed)	24VDC	Red
			3	Drain Position		Purple
			4	Ground		White
J7	DV Drain	N/A	1	Drain + (Open)	24VDC	Black
			2	Drain – (Closed)	24VDC	Red
			3	Drain Position		Purple
			4	Ground		White

M3000 Board, Harnesses, and Pin Positions

Connector	From/To	Harness PN	Pin #	Function	Voltage	Wire Color
J2	Interface Board to Computer	807-4199 SMT Computer to Interface Board Harness	1	12VAC In	12VAC	Black
			2	Ground		
			3	12VAC In	12VAC	
			4	FV Heat Demand		
			5	V Relay	12VDC	
			6	DV Heat Demand		
			7	R/H B/L	12VDC	
			8	Analog Ground		
			9	L/H B/L	12VDC	
			10	ALARM		
			11	Sound Device	5VDC	
			12	ALARM		
			13	FV Probe		
			14	Common Probes		
			15	DV Probe		
			16			
			17			
			18			
			19			
			20			
J6	Next M3000 J7 or Network Resistor	807-4546 Computer Communication Harness	1	Ground		Black
			2	CAN Lo		Red
			3	CAN Hi		White
			4			
			5			
			6			
J7	MIB J1 or previous M3000 J6	807-4546 Computer Communication Harness	1	Ground		Black
			2	CAN Lo		Red
			3	CAN Hi		White
			4			
			5			
			6			
J9	ONLY USED ON NON-AIF UNITS					
J10	Interface Board Ground to Computer	807-4573 Computer Locator Harness	1	Vat #1		Black
			2	Vat #2		
			3	Vat #3		
			4	Vat #4		
			5	Vat #5		
			6			
J11	SD Card					

Frymaster L.L.C.
8700 Line Avenue, Shreveport, LA 71106
Service Center (800) 551-8633 or (318) 865-1711

Printed in the United States of America

February 23, 2010